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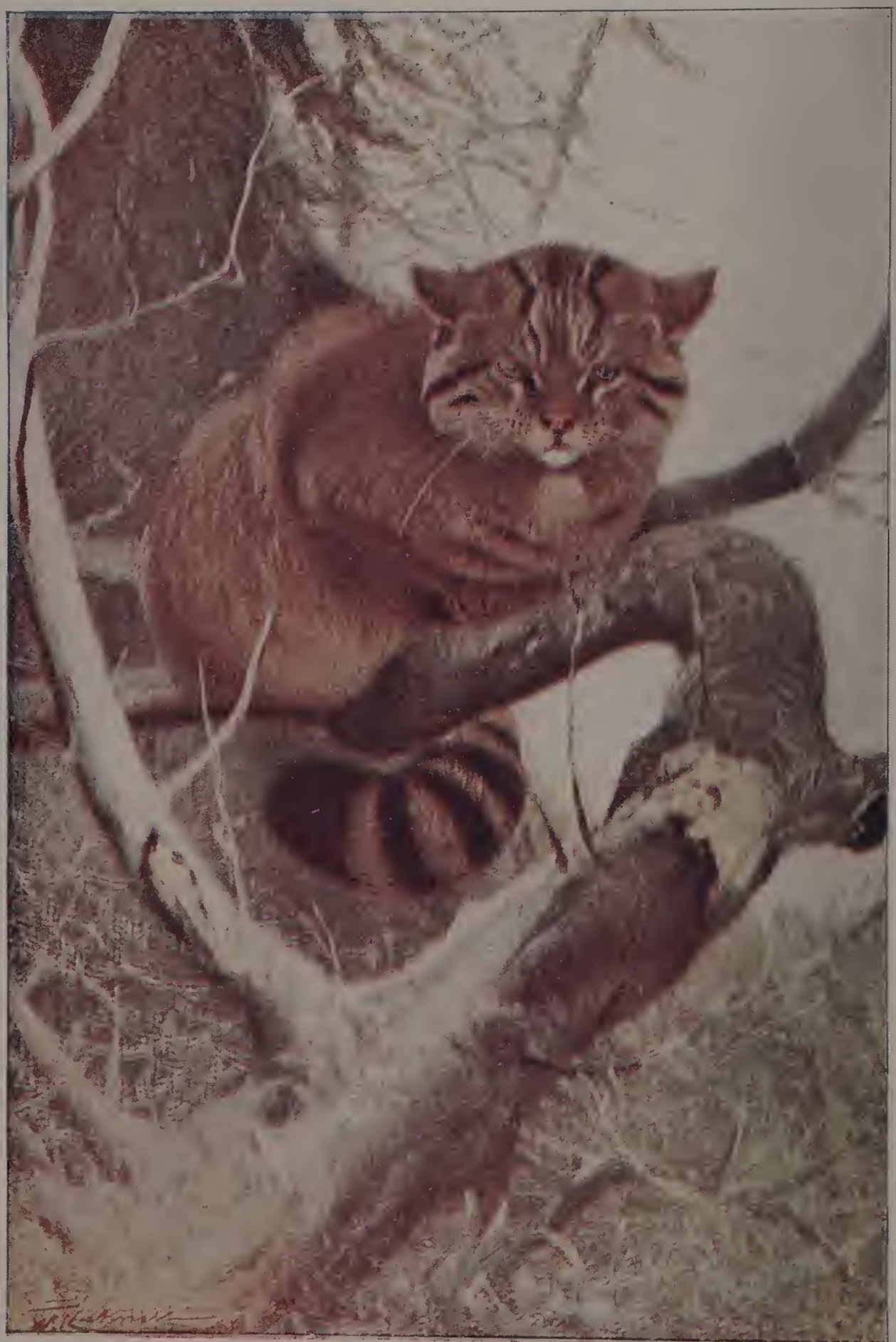

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OF THE
ENGLISH LANGUAGE

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GEORGE EDWIN RINES
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SCHEME OF SOUND SYMBOLS

FOR THE PRONUNCIATION OF WORDS.

Note.—(-) is the mark dividing words respelt phonetically into syllables; (ˈ), the accent indicating on which syllable or syllables the accent or stress of the voice is to be placed.

Sound-symbols employed in Respelling.	Representing the Sounds as exemplified in the Words.	Words respelt with Sound-symbols and Marks for Pronunciation.
ā	mate, fate, fail, aye	*māt, fāt, fāl, ā.*
ă	mat, fat	*măt, făt.*
â	far, calm, father	*fâr, kâm, fâˈthėr.*
ä	care, fair	*cär, fär.*
aw.	fall, laud, law	*fawl, lawd, law.*
ē	mete, meat, feet, free	*mēt, mēt, fēt, frē.*
ĕ	met, bed	*mĕt, bĕd.*
ė	her, stir, heard, cur	*hėr. stėr, hėrd, kėr.*
ī	pine, ply, height	*pīn, plī, hīt.*
ĭ	pin, nymph, ability	*pĭn, nĭmf, ă-bĭlˈĭ-tĭ.*
ō	note, toll, soul	*nōt, tōl, sōl.*
ŏ	not, plot	*nŏt, plŏt.*
ô	move, smooth	*môv, smôth.*
õ	Goethe (similar to *e* in her)	*gõˈtėh.*
ow.	noun, bough, cow	*nown, bow, kow.*
oy	boy, boil	*boy, boyl.*
ū	pure, dew, few	*pūr, dū, fū.*
ŭ	bud, come, tough	*bŭd, kŭm, tŭf.*
ú	full, push, good	*fúl, pûsh, gûd.*
ü	French plume, Scotch guid	*plüm, güd.*
ch	chair, match	*chär, măch.*
ċh	German buch, Heidelberg, Scotch loch (guttural)	*bôċh, hīˈdēl-bĕrċh, lŏċh.*
g	game, go, gun	*gām, gō, gŭn.*
j	judge, gem, gin	*jŭj, jĕm, jĭn.*
k	king, cat, cot, cut	*kĭng, kăt, kŏt, kŭt.*
s	sit, scene, cell, city, cypress	*sĭt, sēn, sĕl, sĭtˈĭ, sīˈprĕs.*
sh	shun, ambition	*shŭn, ăm-bĭshˈŭn.*
th	thing, breath	*thĭng, brĕth.*
ṫh	though, breathe	*thō, brēṫh.*
z	zeal, maze, muse	*zēl, māz, mūz.*
zh	azure, vision	*ăzhˈėr, vĭzhˈŭn.*

UNIVERSAL, a. *ū'nĭ-vĕr'săl* [L. *ŭnĭversālis*, belonging to all, universal—from *univer'sus*, whole—from *ūnus*, one; *versus*, pp of *verto*, I turn]; embracing or comprehending the whole; general; all; comprising all the particulars: N. in *logic*, a general abstract conception applicable to each individual or species contained under it. U'NIVER'SALLY, ad. *-lĭ*, in a manner to comprehend all. U'NIVERSAL'ITY, n. *-săl'ĭ-tĭ*, state of extending to the whole; unlimited application or extent; also U'NIVER'SALNESS, n. *-nĕs*. U'NIVER'SALISM, n. *-săl-ĭzm*, the doctrines or beliefs of the Universalists. U'NIVER'SALIST, n. *-ĭst*, one who holds the doctrine that all men will be saved finally. UNIVERSAL JOINT, a joint on the principle of the ball-and-socket joint, which can be moved in any direction.

UNIVERSALISTS, *ū-nĭ-vĕr'săl-ĭsts:* sect of Christians whose distinctive peculiarity consists in their belief that all erring or sinful beings will ultimately be brought back to God through the irresistible efficacy of His love manifested and applied through Christ. The ground of their faith in the final salvation of all men is not so much any specific and direct assertions of Scripture to that effect as it is a rational deduction from the whole spirit and design of the gospel. They argue that when an infinitely wise, holy, and benevolent God resolved to create man, it must have been with a view to man's everlasting good; that if God allowed man to be tempted and fall, it must have been because He foresaw that through sorrow and suffering man could rise to higher degrees of perfection; that therefore all punishment (or what, with our limited knowledge, we conceive to be such) is of necessity designed as a remedial agent, and not to satisfy God's indignation as a sovereign at the disobedience of His subjects; that no other view of the subject is compatible with the New Test. representation of God as a 'Father,' or with the oft-repeated declaration (in various terms) that Jesus Christ was a propitiation for the sins of the whole world. In answer to those who adduce against them the express words of the Lord Jesus in various passages (e.g., Matt. xxv. 46), 'These shall go away into eternal punishment: but the righteous into eternal life,' they reply that the word *aiōnios*, translated 'eternal' or 'everlasting,' does not necessarily bear that signification; that properly it does not express the idea of duration at all, either finite or infinite, but was used by the sacred writers rather to denote a mode of existence distinct from and wholly dissimilar to any mere *chronic* state or state of being in *time;* in proof of which they point to such passages as—'*This is life eternal*, that they might know Thee, the only true God, and him whom Thou didst send, even Jesus Christ' (Jn. xvii. 3), where eternal life is affirmed to be *knowledge*—a present disposition of mind and heart toward God in Christ, and not a perpetual hereafter of duration.

U. generally differ from the prevalent bodies of Christians in other important doctrines, though such differences are no essential part of Universalism. Most of the U. agree with Unitarians in rejecting the standard doctrine of the Trinity; but there are eminent examples to the contrary;

and they in general do not engage largely in discussions of Christ's nature—rather ascribing to him the highest honor as the one sufficient Saviour sent forth from God. Mostly they are Pelagian in regard to original sin, and reject the notion that the new birth is something supernatural: see PELAGIANISM.

Universalism as a mode of belief is of very ancient origin; and its modern adherents, besides urging its congruity with the divine plan of redemption, as revealed in Scripture, point to the earliest Christian writings—citing passages in favor of the doctrine from many of the church Fathers—Clemens Alexandrinus; Origen; Marcellus of Ancyra; Titus of Bostra; Gregory of Nyssa; Didymus the Blind; Diodorus of Tarsus; Theodore of Mopsuestia; and Victorinus. The doctrine in general is said to have been held by some of the Albigenses, Waldenses, Lollards, and Anabaptists, and it probably had isolated supporters in most of the countries into which the Reformation penetrated. It has had some illustrious sympathizers in the Church of England and among English Nonconformists: among these it is usual somewhat loosely to rank Tillotson, Burnet, Newton, Henry More, Whiston, Jeremy White, Soame Jenyns, David Hartley, William Law, De Quincey, and F. D. Maurice. The same remark is applicable to the French Prot. and German churches; and indeed in all ages a certain class of minds in the church has been disposed toward a hope of some possible universal restoration to holiness and happiness of all fallen intelligences, whether human or angelic. This vague hope—variously traceable to reasoning or to sentiment—is in recent years increasingly manifest in almost all denominations; and its right to exist is not now usually denied in those denominations, so long as it remains an indefinite hope, and does not proceed to any distinct assertion of universal salvation as a doctrine of the Christian faith. It is felt that the proper place for those who make this a *doctrine* is with the Universalists.

The existence of U. as a distinct religious sect is a feature of American rather than of English religious society. The existing denomination of U. dates from the latter half of the 18th c. An English preacher, John Murray, came to America 1770, and began promulgating doctrines later identified with Universalism. He addressed assemblages in various towns along the Atlantic coast from N. J. to Mass. Churches were founded in various places (notably one in Gloucester, Mass.), and ministers installed: there were about 20 ministers in fellowship with Murray 1800. About that time, Hosea Ballou, the real 'father of Universalism' in the United States, was rising to prominence. His teaching found expression in the Profession of Belief adopted by a general convention at Winchester, N. H., 1803. The profession was as follows:

'Art. I. We believe that the Holy Scriptures . . . contain a revelation of the character of God, and of the duty, interest, and final destination of mankind.

'Art. II. We believe that there is one God, whose nature is love, revealed in one Lord Jesus Christ, by one Holy

Spirit of grace, who will finally restore the whole family of mankind to holiness and happiness.

'Art. III. We believe that holiness and true happiness are inseparably connected, and that believers ought to be careful to maintain order, and practice good works; for those things are good and profitable unto men.'

In the several states of the Union, the Universalist churches hold conventions with lay and clerical members as delegates from the local churches. The general convention meets biennially, and is composed of the presidents and secretaries of the state conventions and of clerical and lay delegates from those conventions—each state being entitled to one clerical and two lay delegates, and to an additional number of each class of delegates proportional to the aggregate of its parishes and clergymen. The general convention has jurisdiction over the ecclesiastical organization of the Universalist Church in the United States and the Canadian provinces, and is the final court of appeal in all cases of dispute between state conventions. It is incorporated and is empowered to hold real and personal estate to the value of $500,000, exclusively for 'diffusion of Christian knowledge by means of missions, publications, and other agencies.' Its funds aggregated (1896) $271,014. The Woman's Centenary Association (organized 1869) is the women's national missionary society, having its auxiliaries in the several states. The Young People's Christian Union (organized 1889) is a national society uniting the local Christian unions of young people for religious, philanthropic, missionary, and reform work.

The last 50 years of denominational history has been particularly marked by activity in the founding and development of educational institutions. There are now under the nominal patronage and control of Universalists four of collegiate rank, namely, Tufts College in Massachusetts, Saint Lawrence University in New York, Buchtel College in Ohio, and Lombard College in Illinois, and three academies, namely, Dean Academy in Massachusetts, Goddard Seminary in Vermont, and Weetbrook Seminary in Maine. Tufts College, the oldest and most important of the colleges, is an institution of university rank.

Thus it will be seen that the Universalist Church is thoroughly organized for the work of a living Christian denomination. It is true that the ethical principle which is central in its theology has been accepted by nearly every body of Protestant Christians throughout the world. Its peculiar ideas of eschatology have also spread very widely in all the more progressive organisms of Christendom. In 1908 there were in the United States 728 ministers, 910 churches, and 52,621 members. Consult: Ballou, *A Treatise on Atonement* (1903); Moore, *Universalism, the Doctrine of the Bible;* Brooks, *Universalism: A Practical Power* (1863).

UNIVER'SITY: corporation of teachers or students instituted for promotion of the higher education. The prototype of modern universities may be sought in the schools of Isocrates and Plato at Athens, and the Museum at Alexandria. These institutions resembled the U. of after-times, both in their objects and their organization; and in Greece and Rome, as well as in the later Byzantine empire, something analogous to the degree was conferred on those who had successfully passed through the *trivium* or *quadrivium*, which together comprised what were regarded as the seven liberal arts and sciences. The U. is, however, usually considered to have originated in the 12th or 13th c., and to have grown out of the schools attached to most of the cathedrals and monasteries for the education of churchmen and laymen, and for bringing together the few learned and scientific men in Europe. Such an institute of the higher learning was at first called *studium* or *studium generale*. When a teacher of eminence appeared, such as Abelard or Peter Lombard at Paris, or Irnerius at Bologna, a concourse of admiring students flocked round him; and the members of the *studium generale* formed themselves, for mutual support, into a corporation, on which the general name *universitas* came to be bestowed. In this way the oldest universities arose spontaneously. The crowds drawn from every country of Europe to Paris, Bologna, and other educational resorts had first local immunities bestowed on them for encouragement of learning, and to prevent their resorting elsewhere; and the academical societies thus formed were by papal bulls and royal charters constituted an integral part of the church and state. One great difference existed between the constitution of the two most important universities of early times. In Paris, the teachers alone constituted the corporation; in Bologna, the U. consisted of the students or scholars, who at first held the supreme power, and appointed the academic officials. In this respect Bologna became the model of the subsequent universities of Italy and the provincial universities of France, which were corporations of students; while the universities of Great Britain, Germany, Holland, and Scandinavia were, like Paris, corporations of teachers, and the Spanish universities occupied an intermediate position. With a general resemblance, there was much difference in the constitution and character of the pre-Reformation universities, the form of each being the result of a combination of various circumstances and ideas acting on an originally spontaneous convocation of teachers and scholars. (See PARIS: BOLOGNA: ETC.)

The several *faculties* of a U. are subordinate corporations, consisting of the aggregate of students or teachers in a particular department of knowledge. The number of faculties has varied in different universities. The U. of Paris had at first only a faculty of arts, which, as early as 1169, existed as a separate body, with organization of its own. Faculties of theology, medicine, and canon law were added in the 13th c. Bologna was at first exclusively, as it continued pre-eminently, a school of law. Ox-

ford and Cambridge, in their origin, existed only in the faculty of arts. Some of the smaller French universities, as Orleans and Montpellier, were prohibited from teaching theology, lest they should become rivals to Paris. See UNIVERSITY OF FRANCE.

The granting of degrees was the mode in which the U. reproduced itself. A degree is the recognition of a student having made a certain advance in his career, the degree of doctor or master, in its original idea, entitling the person on whom it was conferred to teach within the limits of the U. Toward the end of the 13th c., Pope Nicholas I. granted to the U. of Paris the right of endowing its graduates with the power of teaching everywhere; and this universal degree, making the recipient of it a member of the community of the learned throughout Christendom, became a link of connection between the universities of Europe. The designation of *Bachelor*, borrowed from the term indicating the probationary stage of knighthood, and implying the lowest stage of U. honor, or the condition of an imperfect graduate, was first introduced in the 13th c. in the U. of Paris, where the bachelor, though intrusted with certain tutorial functions, had no legislative power. The right of teaching (*regendi*) belonged to the master, doctor, or other perfect graduate; and a period of necessary regency was generally fixed, during which the graduates were bound to teach, and after the expiry of which they were at liberty to become non-regents. In the course of time it became the practice to endow a select number of the graduates as public authorized teachers; these privileged and salaried graduates were designated *professors*, and instruction by professors more or less supplanted the original plan of teaching by graduates.

The poverty of a proportion of the students, and the desirableness of domestic superintendence, suggested the institution of halls endowed with property and corporate privileges, called *colleges*. Though originally a provision for poor scholars, they soon assumed the character of boarding-houses for all classes of students, where they were privately trained and prepared for the public lectures. Colleges seem to have been introduced first in Paris, where most of them became appropriated to a particular faculty, or department of a faculty. The college of the Sorbonne (q.v.), founded 1250, came to be in a great measure identified with the theological faculty. Regent masters were named by the faculties as lecturers in the colleges, attendance on whom was made equivalent to attendance on the public courses in the schools of the U., and eventually the college lectures were thrown open to all members of the U.; and it became obligatory in the faculty of arts, and usual in the other faculties, to become a member of some college.

The two highest U. officers have generally been the *rector* and the *chancellor*, the former being the head of the U. in everything except the granting of degrees, which are conferred by the latter as the fountain of honor. Besides the division into faculties, there was in most of the

continental universities a division of the graduates and students into *nations*, in respect of the countries to which they belonged. In Paris, the faculty of arts was divided into four nations, French, Picard, Norman, and German or English; and after the 13th c., these four nations under their respective procurators, and the three subsequently added faculties under their deans, constituted the seven component parts of the U. The rector, with the procurators and deans, formed a court having cognizance of all matters relating to discipline, from which there was an appeal to the U., and thence to the parliament of Paris. In Bologna, after faculties of philosophy, medicine, and theology had been added to those of civil and canon law, the students were classed as *ultramontani* and *citramontani*, and each class divided into nations, presided over by their several counselors or procurators.

The U., with modifications according to the altered circumstances of society, has survived the revolutions of seven centuries. At present, Europe has about 100 universities, some dating from the 12th and 13th c., and others of various degrees of antiquity, including some founded in the 19th c. More than 30 belong in Germany and Austria, and 20 to Italy; Holland, Belgium, Scandinavia, Spain, Portugal, Russia, and Greece contain in all about 30 universities. England has nine. Oxford, Cambridge, London, Durham, Birmingham, Liverpool, Leeds, Sheffield and the Victoria U. of Manchester. Scotland has the four universities of St. Andrews, Glasgow, Aberdeen, Edinburgh; and Ireland has the University of Dublin, and the Royal University of Ireland.

Of the universities of Germany, the oldest are Prague, founded 1384, and Vienna 1365. Heidelberg dates from 1386; Leipzig, 1409; Tübingen, 1477; Jena, 1558; Halle, 1694; Göttingen, 1737; Berlin, 1810; and Bonn, 1818. The chief administrative body of the German universities is the Senatus Academicus, composed of the ordinary professors, presided over by a rector elected yearly, or (at Halle and Tübingen) by a chancellor appointed for life, the exercise of discipline being, however, intrusted to a separate court, presided over by a judicial officer called the syndic. There is a recognized gradation in the professorial office. The highest class are *ordinary professors*, generally men of eminence in their respective departments, elected by government out of three candidates submitted by the faculty to which they belong. Next to them are the *extraordinary professors* of the same branches, with smaller salaries; and then the class of *privat-docents*, who, in the course of time, qualify themselves to be extraordinary professors. An ordinary professor must deliver public lectures on the branch to which he is appointed; an extraordinary professor, or privat-docent, may lecture on what subject he pleases. In addition to the above-mentioned

classes of instruction, there are teachers of modern languages and other branches not forming part of the curriculum. The *Bursæ*, foundations resembling in their origin the English colleges, and the *Convikt*, or free table, are institutions for benefit of the poorer students, from the former of which is derived the name *bursche*, popularly applied to a student in Germany. The German U. system is admirably adapted for advancement of science; its deficiency is chiefly in appliances for superintending the progress of the individual student. The professor is often more an instructor of the world at large by his writings, than of his students by his lectures.—For some principal German universities, see titles of their respective towns.

The two great English universities are little inferior in antiquity to Paris and Bologna. From the beginning of the 12th to the middle of the 14th c., Oxford took nearly as important a part in science and political life as Paris itself, with which it was connected by intimate ties, the most eminent doctors of Oxford acting at the same time as regent-masters in Paris. It espoused the cause of the barons against the crown, and while preserving an intimate relation with the church, generally sided against ecclesiastical abuses. Oxford and Cambridge, though not unlike the continental universities in their origin, developed themselves in a manner peculiar to England. From an early period it was the practice of the students to live in common in halls or hostels, rented from the burghers, under the charge of a common teacher. In 1280 there were 34 halls at Cambridge, some containing 20 to 40 masters of arts, and a proportionate number of younger students. In the course of time, colleges were endowed by benevolent persons for maintenance of the poorer students, and the name *socii*, or *fellows*, was applied to the recipients of the endowments. This assistance was originally meant to last no longer than the completion of the course of study; but as most of the *socii* belonged to the ecclesiastical order, and had no other means of support, an understanding gradually arose that the aid furnished by the college should be continued to the *socius* till he obtained a benefice. These provisions gradually increased in number and importance; and a practice was introduced of the colleges receiving wealthier students as boarders—the origin of the class of commoners or students not on the foundation. Most of the halls fell into decay, and those that remained received a collegiate character. In the 15th c. fellowships were no longer endowed to assist students going through their course of study, but as a permanent provision for poor young men of the clerical order who showed taste for learned pursuits; and the degree of master was made a necessary condition for holding them. In this way the colleges became the U.: the U. acquired a semi-monastic character, which has since more or less adhered to it; and a tutorial system of education within the colleges was almost entirely substituted for instructions by U. professors. For two centuries the staff of professors has had

little to do with academical education or discipline. The instruction of the student is committed to college tutors, assisted by private tutors, and attendance on the professors is in general required neither for U. rank nor for college emoluments. The tutorial system is defended on the ground of its giving the instructor a greater hold over the student's attention. On the other hand it lacks the advantages arising out of the division of labor in the professorial system; and it is now generally allowed that a mixture of both systems of teaching is better than either alone. An effort has been made by the new statutes to render the professorial office in Oxford and Cambridge less of a sinecure than formerly. One of the most remarkable features of the English universities is their wealth in endowments. For the mode of government, see CAMBRIDGE, UNIVERSITY OF: OXFORD UNIVERSITY.

London U. (q.v.) was established by royal charter 1836. It is unlike the older English foundations, and was substantially an examining board, but was re-organized in 1900 as a teaching corporation embracing more than 25 formerly distinct London colleges, hospitals, etc. Durham (q.v.) U. was opened for students 1833, and obtained the right of conferring degrees by royal charter 1837. The general provisions for education are similar to those of Oxford and Cambridge. The U. has connected with it a medical college and one of natural science in Newcastle. The Victoria University of Manchester formerly included colleges at Leeds and Liverpool but these are now separate universities.

The universities of Oxford and Cambridge have since 1603 returned two members each to parliament; the U. of Dublin has the same privilege; while London U. elects one.

The universities of Scotland approached much more nearly to the type of Germany and the Low Countries than of England. The teaching as well as governing body were the professors. Though nearly all the students were Scotchmen, they were nevertheless divided, according to continental usage, into four nations, named from the parts of Scotland to which they belonged. The act of 1858 gave a uniform constitution to all the Scottish universities, each of which has now three governing bodies, the senatus academicus, the university court, and the general council; the chief officers being the principal, the rector, the chancellor, and the vice-chancellor. The universities of Edinburgh and St. Andrews, and the universities of Glasgow and Aberdeen, form two constituencies, each represented by one member of parliament.—For the Scotch Universities, see ABERDEEN: EDINBURGH, UNIVERSITY OF: GLASGOW, UNIVERSITY OF: ANDREWS, ST.

In Ireland, the U. of Dublin was founded 1591 (see DUBLIN, UNIVERSITY OF): it sends two members to parliament. The Queen's U. in Ireland, having its seat in Dublin Castle, was founded by royal charter 1850, and empowered to grant degrees to students of the three Queen's Colleges (q.v.)

respectively at Belfast, Cork, and Galway. A bill passed 1879, altered its title to the Royal U., and gave it right to grant degrees to all qualified comers. The 'Catholic U. of Ireland,' depending for maintenance largely on voluntary subscriptions, has no state charter, but has several affiliated colleges.

The British colonies have several universities. In Canada numerous institutions claim the title: among the more important are McGill U., Montreal; the U. of Toronto; Dalhousie College, at Halifax in Nova Scotia; and Laval U. in Quebec, a Rom. Cath. institution. Australia has well-equipped universities at Melbourne (founded 1854), Sydney (1852), and Adelaide (1874); New Zealand has one at Dunedin; and Cape Colony has a recently founded but thriving U. at Cape Town. The five universities of India, at Calcutta, Madras, Bombay, Punjab and Allahábád, have several affiliated colleges.

Of universities in the United States it is difficult to speak generally, as it is impossible to draw a line between those institutions which may fairly be called universities, and the rest of the multitude of 'universities and colleges' of the govt. reports (see COLLEGE). Of these, some are insignificant or rudimentary, but most of them grant degrees of some sort. There are in the west and southwest many establishments that call themselves universities, though differing as widely as possible in rank, some being of a grade scarcely above academies. The total number of 'universities and colleges' (1904) was 443, aside from 15 women's colleges of higher rank, 43 schools of technology and 106 colleges or institutes for women, mostly of secondary grade. The total number of professors and instructors in these institutions was reported as 17,559 men and 4,267 women. The total number of undergraduate and resident graduate students in these institutions (not counting the 106 above mentioned) is reported as 118,029. Among these were over 2,000 foreign students, 600 being from Canada, 300 from Mexico, and 240 each from Cuba and Japan. Total value of property of these higher institutions amounts to $465,216,545. The endowment funds amount to $206,565,108. The total income from all sources exeluding benefactions, amounted to $40,329,193. State and municipal aid to higher education amounted to $9,922,903. Total value of all benefactions, received during the year amounted to $13,700,559. Total number of young men in public universities was 34,464, and in private universities 52,160. Women were enrolled in the two classes respectively as 9,745 and 32,392. U. S. govt. exercises no control over education other than for officers of the army and navy, except in Alaska, Porto Rico and the Philippines. Some of the schools of higher education have been founded by the particular state in which they stand, and are wholly controlled by the state; some, partly endowed by the state, and to some extent regulated by representatives of the state, are non-sectarian; the numerous sectarian ones are founded and managed by ecclesiastical bodies. Into

these three classes the 'universities' may be divided. The best type of college is a corporation with a charter from the state, and supported by endowments, donations, and fees. Its head is called president, generally chosen by trustees; the chief authority is committed to a body of trustees or overseers, some of whom are appointed by the state; while the executive is mainly in the hands of the faculty, consisting of professors and other instructors. The course of study, comprising the chief subjects of a liberal education, extends over four years. The degree usually conferred at graduation is B.A. Instances of colleges worthy to be regarded as universities are Harvard U. (q.v.), Yale U. (q.v.), Cornell U. (q.v.), Princeton U. (q.v.), U. of Michigan (see MICH., U. OF), Columbia U. (q.v.) in New York, Johns Hopkins U. (q.v.), Northwestern U. (q.v.); see others also under their respective titles. (See NEW YORK (State) for the U. of the State of New York). Oberlin College (q.v.), Ohio, has long done excellent practical work on an extensive scale. Minnesota, California and Illinois are among the largest of the state universities. Leland Stanford Jr. U. in Cal. and Chicago U. in Chicago are among the important institutions of recent origin.

See (further) COLLEGE: also the several special titles of important colleges in the United States.

Some of the most ancient and famous European universities are now defunct; e.g., those of Cologne (founded 1388), Erfurt (1392); or incorporated with more recent ones, as Wittenberg.

See Savigny, *Gesehiehte des Römisehen Reehts im Mittelalter;* Von Raumer, *Gesehichte der Pädagogik;* Von Sybel, *Die Deutsehen und die Auswärtigen Universitäten;* Crevier, *Histoire de l'Université de Paris;* Malden, *History of Universities and Aeademical Degrees;* Kirkpatrick, *Historically Received Coneeption of a University;* Huber, *History of English Universities;* Wood, *History and Antiquities of Oxford;* Dyer, *History of the University of Cambridge;* Mullinger, *History of the University of Cambridge;* Paulsen, *German Universities; Reports of Royal Commissions coneerning the Universities of Seotland; Report of Commissioners on Oxford and Cambridge Universities;* Laurie, *Rise of the University;* Compayré, *Abelan;* Davidson, *Aristotle.*

UNIVERSITY COLLEGE, Oxford: oldest college in the Univ. of Oxford, said to have been founded by Alfred the Great 872. It was restored by William of Durham, rector of Wearmouth, who, 1249, left money as permanent endowment for a certain number of 'masters,' preference being given to those born nearest the city of Durham. Among its subsequent benefactors are—King Henry IV., who founded (1403) three fellowships, at the request of Bp. Skirlaw of Durham (who also is ranked as a 'benefactor'); Henry Percy, Earl of Northumberland, three fellowships (1442), Sir Simon Bennet, Bart., four fellowships and four scholarships (1631). In 1714 Dr. John Radcliffe

founded 2 fellowships, tenable for 10 years by masters of arts, who must travel abroad during 5 years. The present foundation consists of 1 master, 13 fellows, 12 scholars, and several exhibitioners. The patronage consists of 10 livings.

UNIVERSITY EXTENSION: an educational movement designed to bring the advantages of higher education within reach of all the people. As the name indicates, the centre of this work is usually a university, though in some instances libraries or educational associations have taken up university extension teaching. University extension work is carried on by the following agencies: (1) Courses of lectures on some one subject delivered by university professors or others approved by the extension centre; these courses usually consist of six or twelve lectures each, given every week or every two weeks; (2) syllabi, or outline of lectures, including references for outside reading and suggestions for study; distributed to all who attend the lectures; (3) classes for discussion and question conducted by the lecturer before or after each lecture; (4) home reading and preparation of papers on subjects, suggested in the syllabi by those attending the lectures; (5) local examinations conducted by the extension centre; where a university is the centre, credit is often given for complete and satisfactory work in extension courses; (6) traveling libraries consisting of books relating to subjects of lectures sent out by the centre to communities where suitable literature could not otherwise be obtained.

History.—The university extension movement is of English origin; as early as 1850 the University of Oxford entered upon the work of general education by establishing local examinations for those not its regular students; the University of Cambridge soon followed Oxford's example; and in 1873 supplemented the examinations by establishing a course of lectures, thus beginning real extension teaching. Oxford, in turn, established lecture courses in 1878, but did not do continuous work in that line until 1885, when full extension work was organized. Durham University, Victoria University, and the University of London (through its extension board) have also taken up the work, and also Cambridge and Oxford.

In the United States the work was taken up in 1887, the first of the lectures being arranged for by the Buffalo Public Library. Since that time the movement has spread, until nearly all the colleges and universities have courses, either by lectures and in some cases by correspondence also.

UNIVERSITY OF CHICAGO. See CHICAGO, UNIVERSITY OF.

UNIVERSITY OF FRANCE: term specifically applied to the whole French governmental system of edu-

cation as centralized and controlled in one body. In France, since the revolution, the word University has acquired a meaning widely different from that which it bears in other countries—the expression 'Université de France' being nearly equivalent to 'national system of education of France.' All the old universities of the country having been swept away at the Revolution, education had fallen into abeyance. After various attempts at the establishment of primary, secondary, and central schools in the departments, the imperial government adopted a new system, by which the whole educational machinery of the country was centralized at Paris, and committed to a body called the University, with a grand-master at its head, assisted by a council. The system has since undergone various alterations. The governing body, as well for higher educational institutes as for elementary schools, is the ministry of public instruction, supported by a supreme educational court and 18 inspectors-general. France is divided into 16 educational districts, called *Academies*, within whose bounds exist one or more of the *Faculties* of theology, law, medicine, and science and literature. Such faculties are found in 18 towns besides Paris; but only in Paris are the five co-existing faculties organized into a university. The monopoly, hitherto enjoyed by the University of France, of opening schools of law and medicine, and of conferring degrees, was abolished 1875. The Roman Catholics have availed themselves of this to institute colleges claiming the dignity of universities, but under ecclesiastical control: thus there is now a 'Catholic University of Paris.'—For the Paris faculties of the University of France, see SORBONNE. The Collége de France (q.v.) is a quite distinct institution, independent of the University of France.

UNIVERSITY OF CALIFORNIA. See CALIFORNIA, UNIVERSITY OF.

UNIVERSITY OF NORTH CAROLINA. See NORTH CAROLINA, UNIVERSITY OF.

UNIVERSITY OF THE PACIFIC: located at San José, Cal. It was founded at Santa Clara in 1851 under the auspices and control of the Methodist Episcopal Church. In 1871 it was moved to San José. About 40 years after its incorporation Napa College was consolidated with it, and the name of the University of the Pacific adopted. It is open to both men and women. The organization of the university includes the college of liberal arts, the academy, the department of elocution and oratory, the commercial college, the art department, and the conservatory of music. The university is situated in the Santa Clara valley, within easy reach of both San José and Santa Clara; and occupies five buildings. The library contains 2,000 volumes; the income amounts to $23,000; the students number 272, and the faculty 16.

UNIVERSITY OF ROCHESTER: located at Rochester, N. Y. The university was established by the Baptists of New York state with the aid of Rochester citizens; it was opened to students in 1850, and received its permanent charter in 1851. In 1900 it was opened to women on equal terms with men. Though it was incorporated as a university, it has never sought to do university work, but aims to give its students a thorough, liberal college course of the best type. It offers three courses, classical, philosophical, and scientific, and confers the three degrees of A.B., B.PH., and B.S. Each course has certain prescribed studies and elective studies, the elective work beginning in the Sophomore year. In the scientific course arrangements have been made by which students taking certain electives and some technical work in the Mechanics' Institute of Rochester may enter the third year of the best technical schools. There is also a teachers' training department and a manual training normal course; graduate work is provided leading to the master's degree. Saturday classes are arranged for the benefit of teachers. There are 118 scholarships, of which 40 are for students for the Baptist ministry, 24 for graduates of the Rochester high school, and 12 for women. The university campus comprises 24 acres, situated in one of the most beautiful parts of the city; the buildings include Anderson hall, Sibley hall, Reynolds Memorial laboratory (chemistry), and the Alumni gymnasium (for the use of men students); there are no dormitories; many students live in the chapter-houses of the Greek letter fraternities. The library contains, 4,000 volumes; the students number 264, of whom 72 are women.

UNIVERSITY SETTLEMENTS. See SOCIAL AND COLLEGE SETTLEMENTS.

UNIVERSITY OF THE SOUTH: located at Sewanee, Tenn. It was chartered in 1857 by the southern dioceses of the Protestant Episcopal church; the site and endowment were obtained, and the central building begun, when the civil war stopped further operations and rendered the endowment worthless. In 1867 more funds were obtained, largely through the efforts of Bishop Quintard of Tennessee, and the grammar school (secondary grade) and academic department (collegiate grade) opened to students in 1868. The university now includes the grammar school, the academic department, the theological department organized in 1878, the medical department established in 1892, and the law department established in 1893, the school of pharmacy established in 1904, and a training school for nurses, connected with the medical and pharmaceutical departments. The university controls a domain of nearly 10,000 acres in the midst of the beautiful scenery of the Cumberland plateau; a reservation of 1,000 acres surrounds the central buildings, from which building lots are leased for long terms. The chief

buildings are Saint Luke's Memorial Hall (theological department), Walsh Memorial Hall, the Library with a tower modeled upon that of Magdalen College Chapel, Oxford, in which are a clock and peal of bells, Thompson Hall (medical department), Hodgson Memorial Infirmary, Hoffman Memorial Hall (dormitory), Quintard Memorial Hall (grammar school), the chapel, and Forensic Hall; a new gymnasium was in process of erection in 1904. The library contains 23,330 volumes; the students in all departments number 478, and the faculty 45.

UNIVERSITY OF SOUTHERN CALIFORNIA, THE: located at Los Angeles. It was established in 1879 under the auspices of the Methodist Episcopal church, and first opened to students in 1880. Men and women are admitted on equal terms. The university organization includes the college of liberal arts, the college of medicine, the college of law, the college of dentistry, the college of music, the college of art, the preparatory school, and the commercial department. The university campus comprises 10 acres, three miles and a half from the main part of the city; the buildings include the main building and the building of the college of music, and the preparatory school, the colleges of medicine, dentistry, and law have more central locations within the city; the college of fine arts has a building and grounds of its own at Gavanza, one of the suburbs of Los Angeles. The library contains 2,500 volumes; the Los Angeles County Law Library is also open to the students of the College of Law. The students number 636, the faculty 110.

UNIVERSITY OF THE STATE OF NEW YORK: For an account of the history and work of the university, see NEW YORK STATE UNIVERSITY. A reorganization of the New York state educational system was effected in March, 1904, in accordance with which the board of regents consists of 11 members, elected by the legislature, as far as possible one from each judicial district. The members of the board first elected under the new law were chosen from the former board of regents for a term of one, two, three, four, five, six, seven, eight, nine, ten, and eleven years respectively; their successors will be elected for the full term of 11 years. The office of secretary of the board of regents is abolished, and the duties of the office conferred upon a new officer, the commissioner of education, who also performs the duties of the former superintendent of public instruction; the commissioner of education first elected is chosen by the legislature for a term of six years; his successor is to be appointed by the board of regents and to serve during the pleasure of the board. The supervision of elementary and secondary schools, including all schools except colleges, technical, and professional schools, is devolved upon the commissioner. Thus the regents of the university lose their direct control over secondary schools, but gain the power of appointing the commissioner who has

supervision of all schools, while his appointments in all departments are also subject to their approval; they also have power to establish such regulations as are necessary to carry out state laws relating to education. All their other powers are the same as formerly. The purpose of the law is to unify the educational system, control of which was formerly divided between the regents and the superintendent of public instruction.

UNIVERSITY OF WOOSTER: located at Wooster, Ohio. It was founded under the auspices of the Presbyterian church, was chartered in 1866, and first opened to students in 1870. In 1899 the charter was revised, and the power of electing the members of the board of trustees delegated to the Presbyterian Synod of Ohio. Previously the board was self-perpetuating. The organization of the university now consists of the Collegiate Department, the Preparatory Department (organized 1872), the Conservatory of Music (established 1882), the School of Art (established 1895), the Bible and Missionary Training School (established 1903), and the Summer School (organized in 1876, reorganized in 1895). All departments are open to women. The university has a campus of 32 acres, on a hill overlooking the city; the buildings include Kauke Hall (the main building), Severance Hall (departments of chemistry and physics), Scovel Hall (departments of geology and biology), Taylor Hall (preparatory department), the library, the chapel, Hoover Cottage (the women's dormitory), the Kauke Conservatory of Music, the observatory, and the gymnasium. The library contains 26,000 volumes; the students including the Summer School number 882.

UNJOINED, a. *ŭn-joynd':* not connected; not united.

UNJOINTED, a. *ŭn-joynt'ĕd:* having no joinings; having no articulation, as the stem of a plant.

UNJUDGED, a. *ŭn-jŭjd':* not tried; not censured rashly.

UNJUST, a. *ŭn-jŭst':* not just; not actuated or acting by principles of right or equity; contrary to the standard of right; not equitable. UNJUSTLY, ad. wrongfully.

UNJUSTIFIABLE, a. *ŭn-jŭs'tĭ-fī'ă-bl:* that cannot be proved to be right, that cannot be defended. UNJUS'TIFI'ABLY, ad. UNJUS'TIFIED, a. not vindicated; not pardoned. UNJUS'TIFI'ABLENESS, n. *-ă-bl-nĕs,* the quality of being unjustifiable.

UNKEMPT, a. *ŭn-kĕmt':* [see COMB 1]: uncombed; unpolished.

UNKENNEL, v. *ŭn-kĕn'nĕl:* to drive from a hole, as a fox; to release from a kennel; to rouse from secrecy. UNKEN'NELLING, imp. UNKEN'NELLED, pp.; ADJ. let loose from confinement; driven from his hole, as a fox.

UNKEPT, a. *ŭn-kĕpt':* not retained or preserved; not observed.

UNKIND, a. *ŭn-kīnd′:* not benevolent; not obliging; harsh; cruel; in *OE.*, unnatural. UNKIND′LY, ad. in an unkind manner; without kindness or affection; in *OE.*, in a manner contrary to nature: ADJ. harsh; disagreeable; in *OE*, unnatural; contrary to nature; malignant. UNKIND′NESS, n. want of good-will; disobliging treatment; want of natural affection. UNKIND′LINESS, n. quality of being unkindly; malignity; ill-will.

UNKING, v. *ŭn-kĭng′:* to deprive of royalty. UNKINGLIKE, a. *ŭn-kĭng′līk*, or UNKING′LY, a. unbecoming a king; not noble.

UNKISS, v. *ŭn-kĭs′:* in *OE.*, to cancel an oath or obligation by kissing again. UNKISSED, a. *ŭn-kĭst′*, not kissed.

UNKNIGHTLY, a. *ŭn-nīt′lĭ:* unbecoming a knight.

UNKNIT, v. *ŭn-nĭt′:* to separate; to loose; to open out work that has been knit.

UNKNOT, v. *ŭn-nŏt′:* to untie; to free from knots UNKNOT′TED, a. *-tĕd*, untied.

UNKNOWING, a. *ŭn-nō′ĭng:* not knowing; ignorant. UNKNOW′INGLY, ad. UNKNOW′ABLE, a. *-nō′ă-bl*, that cannot be known; incapable of being known: N. that which cannot be known. UNKNOWN′, a. not known; not understood clearly; doubtful; not recognized by remembrance; not ascertained; greater than is imagined; in *OE*, not having had intercourse with; not having had communication: N. one who cannot be identified; a stranger. UNKNOWN TO, not within the knowledge of. THE UNKNOWN, that which is not or cannot be known.

UNLABORIOUS, a. *ŭn′lă-bō′rĭ-ŭs:* not laborious; not difficult to be done. UN′LABO′RIOUSLY, ad. UNLA′BORED, a. not tilled; that offers without effort; easy; not stiff, as speech.

UNLACE, v. *ŭn-lās′:* to loose from a fastening of cord or strings passed through holes; in *OE.*, to divest of ornaments or dress. UNLAC′ING, imp. UNLACED′, pp.

UNLADE, v. *ŭn-lād′:* to unload; to take out the cargo of. UNLA′DING, imp. UNLA′DEN, pp.

UNLADYLIKE, a. *ŭn-lā′dĭ-līk:* not becoming a lady.

UNLAID, a. *ŭn-lād′:* not placed; not fixed; not allayed or pacified.

UNLAMENTED, a. *ŭn′lă-mĕnt′ĕd:* not regretted; not mourned for.

UNLASH, v. *ŭn-lăsh′:* to loose, as what is bound with a rope to something else.

UNLATCH, v. *ŭn-lăch′:* to open or loose by lifting the latch.

UNLAVISHED, a. *ŭn-lăv′ĭsht:* not lavished; not wasted; not thrown away.

UNLAW, v. *ŭn-law′:* in *OE.*, to take from law its authority; in *Scots law*, to impose a fine on: N. in *Scots law*, a fine or penalty imposed on law-breakers; an offense against the law.

UNLAWFUL, a. *ŭn-law'fŭl:* contrary to law; illegal; bastard. UNLAW'FULLY, ad. UNLAW'FULNESS, n. state of being illegal or illegitimate.

UNLAY, v. *ŭn-lā':* to untwist, as the strands of a rope.

UNLEARN, v. *ŭn-lêrn':* to forget something that has been learned. UNLEARN'ING, imp. UNLEARNED', pp *-lêrnd'*, forgotten: ADJ. *ŭn-lêrn'ĕd*, ignorant; not instructed; not gained by study; in *OE.*, not suitable to a learned man. UNLEARN'EDLY, ad.

UNLEAVENED, a. *ŭn-lĕv'nd:* not fermented, as bread.

UNLEAV'ENED BREAD: as especially assigned for use in the Eucharist (q.v.), bread made without leaven or yeast; bread in which no ferment or leaven has been used. —Among the Jews the paschal lamb was eaten with U. B. The use of U. B. in the Eucharist has long been a subject of controversy between the Latin Church on one hand and the Greek and other oriental churches on the other; with the latter of whom the Reformed churches in later times have conformed in their practice at the Lord's Supper. The early history of the usage is obscure; but the Western Church had certainly, from a very remote date, employed *azyms*, or U. B.; nor was this usage made a subject of controversy with the Latins by Photius, on occasion of the dispute between the churches, which arose during his patriarchate. In the later controversy, however, under Michael Cerularius (see GREEK CHURCH), the question of azyms became very prominent, and the diversity of practice is still in controversy between the Greeks and Latins. The principal argument alleged by the advocates of leavened bread is founded on the assumption that the Last Supper of the Lord Jesus took place on the eve of the Passover, i.e., on the 13th day of the month Nisan, on which day common bread, and not the azyms, must have been used; and on this and some other grounds, some writers, even among the Rom. Catholics, especially the learned Jesuit Sirmond, have maintained that the Last Supper was actually celebrated in leavened bread. On the other hand, however, it is contended that the Last Supper, being held in the evening of that day, was, in the strictest sense, Christ's celebration of the Passover, and therefore (Ex. xii. 8–20), that the bread can have been no other than azym, or unleavened. All Rom. Catholic writers, and the more learned among the Greeks, are agreed that the Eucharist may be *validly* consecrated with either leavened or unleavened bread.

UNLESS, conj. *ŭn-lĕs'* [originally written *onless, onlesse*, a combination of *on* with *less*]: except; if not; supposing that not: also used prepositionally by Shakespeare.

UNLESSONED, a. *ŭn-lĕs'nd:* not taught.

UNLETTERED, a. *ŭn-lĕt'tĕrd:* not learned; untaught; illiterate; ignorant; not marked with letters.

UNLEVEL, a. *ŭn-lĕv'ĕl:* not even. UNLEV'ELLED, a. not levelled; not laid even.

UNLICENSED, a. *ŭn-lī'sĕnst:* not licensed; without permission by authority; carried on without authority.

UNLICKED, a. *ŭn-lĭkt':* shapeless; not formed to smoothness; rough; uncultured.

UNLIGHTED, a. *ŭn-līt'ĕd:* not lighted, as a lamp; not kindled; not illuminated.

UNLIGHTSOME, a. *ŭn-līt'sŭm:* dark; wanting light.

UNLIKE, a. *ŭn-līk':* having no resemblance; dissimilar. UNLIKE'LY, a. improbable; such as cannot be reasonably expected: AD. improbably. UNLIKE'NESS, n. want of resemblance. UNLIKE'LIHOOD, n., or UNLIKE'LINESS, n. state of being unlikely; improbability.

UNLIMBER, v. *ŭn-lĭm'bĕr:* in *artillery,* to detach the limber from (a field-piece). UNLIM'BERING, imp. UNLIM'BERED, pp.

UNLIMITED, a. *ŭn-lĭm'ĭ-tĕd:* not limited; having no bounds; indefinite; not restrained. UNLIM'ITEDNESS, n. *-nĕs,* the state of being unlimited. UNLIM'ITABLE, a. *-tă-bl,* in *OE.,* incapable of being limited.

UNLINEAL, a. *ŭn-lĭn'ē-ăl:* not lineal; not coming in the order of succession.

UNLINING, n. *ŭn-līn'ĭng:* in *bot.,* the separation of parts originally united; same as CHORISIS.

UNLINK, v. *ŭn-lĭngk':* to separate links; to disconnect; to loosen.

UNLIQUEFIED, a. *ŭn-lĭk'wĕ-fīd:* not dissolved.

UNLIQUIDATED, a. *ŭn lĭk'wĭ-dā-tĕd:* not liquidated or settled; not fixed as regards amount; not paid.

UNLOAD, v. *ŭn-lōd':* to discharge of a load or cargo, as a ship; to disburden; to take out the charge of a gun. UNLOAD'ING, imp. UNLOAD'ED, pp.

UNLOCATED, a. *ŭn lō'kā-tĕd:* not located or placed; in the *United States,* unsurveyed and not laid out, as land.

UNLOCK, v. *ŭn-lŏk':* to unfasten; to lay open. UNLOCKED', a. not made fast.

UNLOOKED-FOR, a. *ŭn-lûkt'fŏr:* not expected; not foreseen. UNLOOKED', a. in *OE.,* unlooked-for.

UNLOOSE, v. *ŭn-lôs':* to loose; to untie; to let go from a fastening; to unravel. UNLOOS'ING, imp. UNLOOSED', pp. set free; untied. UNLOOSEN, v. *ŭn-lôs'n,* to untie.

UNLOVED, a. *ŭn-lŭvd':* not loved. UNLOVE'LY, a. destitute of the qualities that attract love; not amiable; not beautiful. UNLOVE'LINESS, n. want of beauty or the qualities that attract love. UNLOV'ING, a. not fond. UNLOV'INGLY, ad.

UNLUCKY, a. *ŭn-lŭk'ĭ:* unfortunate; not successful; subject to frequent misfortunes; ill-omened. UNLUCK'ILY, ad. unfortunately. UNLUCK'INESS, n. ill-fortune.

UNMADE, a. *ŭn mād':* not yet formed: see UNMAKE.

UNMAIDENLY, a. *ŭn-mād'n-lĭ:* not becoming a maiden.

UNMAIMED, a. *ŭn-māmd′:* not maimed; not disabled in any limb; sound.

UNMAKE, v. *ŭn-māk′:* to destroy the essential form and qualities of; to deprive of form or being. UNMA′KING, imp.

UNMALLEABLE, a. *ŭn-măl′lĕ-ă-bl:* not malleable; not capable of being hammered into a plate.

UNMAN, v. *ŭn-măn′:* to deprive of the qualities of a man; to dishearten; to deject; to emasculate; to deprive of men. UNMAN′NING, imp. UNMANNED′, pp. a. deprived of the fortitude proper to a man; dispirited; dejected; not furnished with men, as a ship or fort; in *falconry*, not tamed. UNMAN′LIKE, a. not becoming a man. UNMAN′LY, a. unbecoming a man; not worthy of a noble mind; base· cowardly. UNMAN′LINESS, n. the state or quality of being unmanly. UNMAN′FUL, a. not becoming a man.

UNMANAGEABLE, a. *ŭn-măn′āj-ă-bl:* not manageable; not easily restrained or directed; not easily wielded. UNMAN′AGEABLY, ad. UNMAN′AGEABLENESS, n. the state of being unmanageable. UNMAN′AGED, a. not tutored; not broken in.

UNMANNERLY, a. *ŭn-măn′nĕr-lĭ:* ill-bred; rude in behavior: AD. in *OE.*, uncivilly. UNMAN′NERED, a. uncivil; rude. UNMAN′NERLINESS, n. rudeness of behavior.

UNMANUFACTURED, a. *ŭn-măn′ū-făk′tūrd:* not manufactured; not wrought into proper form for use.

UNMANURED, a. *ŭn′mă-nūrd′:* not enriched by manure.

UNMARKED, a. *ŭn-mârkt′:* having no mark; not regarded; undistinguished.

UNMARKETABLE, a. *ŭn-mâr′kĕt-ă-bl:* not fit for sale.

UNMARRED, a. *ŭn mârd′:* not injured or spoiled.

UNMARRIAGEABLE, a. *ŭn-măr′ĭj-ă bl:* too young to be married; disqualified, as by youthfulness, for marriage. UNMAR′RIED, a. having no husband or wife.

UNMARSHALLED, a. *ŭn-mâr′shald:* not disposed or arrayed in order.

UNMASK, v. *ŭn-mâsk′:* to strip off any disguise; to lay open; to expose to view. UNMASK′ING, imp. UNMASKED′, pp.: ADJ. open; exposed to view.

UNMATCHED, a. *ŭn-măcht′:* having no match or equal. UNMATCH′ABLE, a. *-ă-bl*, not to be matched.

UNMEANING, a. *ŭn-mēn′ĭng:* having no meaning; not expressive; not indicating intelligence. UNMEAN′INGLY, ad. UNMEAN′INGNESS, n. the state of being unmeaning. UNMEANT′, a. *-mĕnt*, not intended.

UNMEASURABLE, a. *ŭn-mĕzh′ū-rā-bl:* boundless; immeasurable. UNMEAS′URABLY, ad. *-blĭ*, beyond all bounds; beyond measure. UNMEAS′URED, a. not measured; plentiful beyond measure; immense; infinite.

UNMEDITATED, a. *ŭn-mĕd′ĭ-tā-tĕd:* not meditated; not prepared by previous thought.

UNMEET, a. *ŭn-mēt':* not fit or proper; not worthy or suitable. UNMEET'LY, ad. in an unmeet manner; not properly. UNMEET'NESS, n. unfitness; unsuitableness.

UNMELLOWED, a. *ŭn-mĕl'lōd:* not fully matured; not toned down, as by age.

UNMELODIOUS, a. *ŭn'mĕl-ō'dĭ-ŭs:* wanting melody; harsh. UN'MELO'DIOUSLY, ad. UN'MELO'DIOUSNESS, n. the state of being unmelodious.

UNMELTED, a. *ŭn-mĕlt'ĕd:* not melted; undissolved; not softened.

UNMENTIONABLE, a. *ŭn-mĕn'shŭn-ă-bl:* not to be mentioned or named. UNMEN'TIONED, a. not named.

UNMERCENARY, a. *ŭn-mėr'sĕ-năr-ĭ:* not mercenary; not venal; disinterested.

UNMERCHANTABLE, a. *ŭn-mėr'chănt-ă-bl:* that cannot be sold; unsalable.

UNMERCIFUL, a. *ŭn-mėr'sĭ-fûl:* cruel; pitiless; not disposed to spare or forgive; hard-hearted. UNMER'CIFULLY, ad. UNMER'CIFULNESS, n. want of tenderness and compassion toward those in one's power.

UNMERITED, a. *ŭn-mĕr'ĭ-tĕd:* not deserved; unjust. UNMER'ITABLE, a. *-ĭ-tă-bl,* in *OE.,* having no merit.

UNMILITARY, a. *ŭn-mĭl'ĭ-tėr-ĭ:* not according to military rules or customs; not military in character.

UNMILKED, a. *ŭn-mĭlkt':* not milked.

UNMILLED, a. *ŭn-mĭld':* not milled, as coin.

UNMINDED, a. *ŭn-mīnd'ĕd:* not heeded. UNMIND'FUL, a. not attentive; regardless. UNMIND'FULLY, ad. UNMIND'FULNESS, n. the state of being unmindful.

UNMINGLED, a. *ŭn-mĭng'gld:* not mixed; pure.

UNMINISTERIAL, a. *ŭn'mĭn-ĭs-tē'rĭ-ăl:* not ministerial; not pertaining to or befitting a minister. UN-MINISTE'RIALLY, ad.

UNMISSED, a. *ŭn-mĭst':* not missed; not perceived to be gone or lost.

UNMISTAKABLE, a. *ŭn'mĭs-tā'kă-bl:* that cannot be mistaken or misunderstood; also UNMISTAKEABLE. UN'MISTA'KEN, a. not wrong in opinion or judgment; sure.

UNMITIGABLE, a. *ŭn-mĭt'ĭ-gă-bl:* that cannot be alleviated or soothed. UNMIT'IGATED, a. not softened in severity or hardness; not lessened.

UNMIXED, a. *ŭn-mĭkst':* not mingled; pure; unadulterated.

UNMODERNIZED, a. *ŭn-mŏd'ėrn-īzd:* not modernized; not adapted to modern ideas or style.

UNMODIFIED, a. *ŭn-mŏd'ĭ-fīd:* not altered in form. UNMOD'IFI'ABLE, a. not to be modified or qualified in meaning. UNMOD'IFI'ABLENESS, n.

UNMOD'IFIED-DRIFT, n.: in *geol.*, a Canadian glacial deposit laid down while glacial action was at its maximum in N. America; called also *Hardpan*.

UNMODISH, a. *ŭn-mō'dĭsh:* not in the mode; not fashionable.

UNMODULATED, a. *ŭn-mŏd'ū-lā-tĕd:* not modulated; not varied in a musical manner, as a sound or musical note.

UNMOIST, a. *ŭn-moyst':* not moist or wet. UNMOISTENED, a. *ŭn-moys'nd,* not made moist or humid.

UNMOLD, v. *ŭn-mōld':* to change as to the form. UNMOLD'ED, a. not shaped or formed.

UNMOLESTED, a. *ŭn'mŏ-lĕst'ĕd:* not molested; not disturbed; free from disturbance.

UNMOOR, v. *ŭn-môr':* to loose from anchorage or moorings, as a ship; to bring to the state of riding with a single anchor. UNMOOR'ING, imp. UNMOORED', pp.

UNMORTIFIED, a. *ŭn-môr'tĭ-fīd:* not mortified; not subdued by sorrow.

UNMOTHERLY, a. *ŭn-mŭth'ėr-lĭ:* not becoming a mother.

UNMOUNTED, a. *ŭn-mownt'ĕd:* not mounted, in any sense of the verb *mount*.

UNMOVABLE, a. *ŭn-môv'ă-bl:* that cannot be moved; firm; immovable. UNMOV'ABLY, ad. UNMOVED', a. not transferred from one place to another; not changed in purpose; firm; not having the passions excited; tranquil. UNMOV'EDLY, ad. UNMOV'ING, a. not moving; having no power to affect the passions.

UNMUFFLE, v. *ŭn-mŭf'l:* to remove a muffler or the mufflings from; to uncover.

UNMURMURING, a. *ŭn-mėr'mėr-ĭng:* not complaining. UNMUR'MURED, a. not complained of.

UNMUSICAL, a. *ŭn-mū'zĭ-kăl:* not musical; harsh; not pleasing to the ear. UNMU'SICALLY, ad.

UNMUTILATED, a. *ŭn-mū'tĭ-lā-tĕd:* not mutilated; entire.

UNMUZZLE, v. *ŭn-mŭz'l:* to loose from a muzzle; remove the muzzle from; to free from restraint. UNMUZ'ZLING, imp. UNMUZ'ZLED, pp.

UNNA, *ûn'nâ:* small town of Prussia, in Westphalia, 19 m. n.w. of Arnsberg. It was formerly fortified, was one of the Hanse Towns (q.v.) and had a part in the history of the Femgerichte (q.v.). About a m. to the north are the famous salt-works of Königsborn, which yield 120,000 cwts. of salt annually. The principal industries are weaving (linen and hosiery), brewing, and distilling. Pop. about 7,700.

UNNAMED, a. *ŭn-nāmd':* not named or mentioned.

UNNAPPED, a. *ŭn-năpt':* without nap, as cloth.

UNNATURAL, a. *ŭn-năt'ū-răl* or *-năt'chū-răl:* contrary to nature; acting without the affections of our common humanity; not agreeable to the real condition of persons or things; forced; artificial; affected. UNNAT'URALLY, ad. UNNAT'URALIZE, v. *-ăl-īz,* to divest of the affections which have been implanted by nature; to divest of the character and status of a subject or citizen. UNNAT'URALIZED, a. *-īzd,* not naturalized; not admitted to the privileges of a subject or citizen.

UNNAVIGABLE, a. *ŭn-năv'ĭ-gă-bl:* not navigable. UNNAV'IGATED, a. not passed over in ships.

UNNECESSARY, a. *ŭn-nĕs'ĕs-sĕr-ĭ:* needless; useless; not required by the circumstances of the case. UNNEC ESSARILY, ad. needlessly. UNNEC'ESSARINESS, n. *-nĕs,* uselessness; needlessness.

UNNEIGHBORLY, a. *ŭn-nā'bĕr-lĭ:* not neighborly; not in keeping with the duties or obligations implied in being neighbors; not kind and friendly: AD. in *OE.*, in a manner not becoming a neighbor.

UNNERVE, v. *ŭn-nĕrv':* to deprive of force or strength; to enfeeble. UNNERV'ING, imp. UNNERVED', pp. deprived of nerve or strength: ADJ. weak; feeble.

UNNOTED, a. *ŭn-nō'tĕd:* not noted; not observed or remarked; not distinguished; not recorded.

UNNOTICED, a. *ŭn-nō'tĭst:* not regarded or observed; not treated with the usual marks of respect; not hospitably entertained; slighted.

UNNUMBERED, a. *ŭn-nŭm'bĕrd:* not numbered or enumerated; indefinitely numerous; innumerable.

UNOBJECTIONABLE, a. *ŭn'ŏb-jĕk'shŭn-ă-bl:* not liable to objection; that need not be condemned as faulty or improper.

UNOBNOXIOUS, a. *ŭn'ŏb nŏk'shŭs:* not liable; not exposed to hurt; not obnoxious.

UNOBSCURED, a. *ŭn'ŏb-skūrd':* not darkened or clouded.

UNOBSERVABLE, a. *ŭn'ŏb-zĕr'vă-bl:* not discoverable. UN'OBSER'VANT, a. not attentive; heedless. UN OBSERVED', a. not noticed; not regarded; not heeded. UN OBSER'VEDLY, ad. UN'OBSER'VING, a. inattentive; heedless. UNOBSER'VANCE, n. *-văns,* state or quality of being unobservant; disregard.

UNOBSTRUCTED, a. *ŭn'ŏb-strŭkt'ĕd:* not obstructed; not filled with impediments; not hindered. UN OBSTRUCTIVE, a. not presenting any obstacle.

UNOBTAINABLE, a. *ŭn'ŏb-tān'ă-bl:* that cannot be obtained; not within reach or power. UN'OBTAINED', a. not gained; not acquired.

UNOBTRUSIVE, a. *ŭn'ŏb-trō'sĭv:* not forward; modest. UNOBTRU'SIVELY, ad.

UNOCCUPIED, a. *ŭn-ŏk'kū-pīd:* not occupied; not possessed; not engaged in business; not employed, as time; being at leisure.

UNOFFENDING, a. *ŭn'ŏf-fĕnd'ĭng:* not offending; not giving offense; harmless; not sinning.

UNOFFICIAL, a. *ŭn'ŏf fĭsh'ăl:* not official; not pertaining to an office or public trust; not proceeding from the proper authority; in a private capacity. UN'OFFI'CIOUS, a. not forward or intermeddling.

UNOPENED, a. *ŭn-ō'pnd:* not opened; remaining close, shut, or sealed.

UNOPERATIVE, a. *ŭn-ŏp'ĕr-ā-tĭv:* producing no effect; inoperative.

UNOPPOSED, a. *ŭn'ŏp pōzd':* not opposed; not resisted; not meeting with any hindrance.

UNOPPRESSED, a. *ŭn'ŏp-prĕst':* not unduly burdened. UN'OPPRESS'IVE, a. not oppressive or burdensome.

UNORGANIZED, a. *ŭn-ŏr'găn-īzd:* not organized; not having the parts arranged and constituted; destitute of organic structure.

UNORIGINATED, a. *ŭn'ō-rĭj'ĭ-nā-tĕd:* having no birth or creation. UN'ORIG'INAL, a. *-ĭ-năl,* not original; having no birth; ungenerated.

UNORNAMENTAL, a. *ŭn-ŏr'nă-mĕnt'ăl:* not ornamental—hence, plain; undecorated. UNOR'NAMENTED, a. not adorned.

UNORTHODOX, a. *ŭn-ŏr'thŏ-dŏks:* not orthodox; heterodox. UNOR'THODOXY, n. want of orthodoxy.

UNOSTENTATIOUS, a. *ŭn-ŏs'tĕn-tā'shŭs:* not ostentatious; not making a display; not showy; modest; unassuming. UN'OSTENTA'TIOUSLY, ad. UN'OSTENTA'TIOUSNESS, n. *-nĕs,* freedom from ostentation.

UNOWED, a. *ŭn-ōd':* not owed; in *OE.*, having no owner.

UNOWNED, a. *ŭn-ōnd':* not owned or acknowledged, as an act, etc.; having no known owner; not divulged.

UNOXYGENATED, a. *ŭn-ŏks'ĭ-jĕn-ā-tĕd,* or UNOX'YGENIZED, a. uncombined with oxygen.

UNPACIFIED, a. *ŭn-păs'ĭ-fīd:* not pacified; not appeased; not calmed.

UNPACK, v. *ŭn-păk':* to unloose or open and remove the contents of, as a bale of cloth, a box, or the like; to disburden. UNPACK'ING, imp. UNPACKED', pp.: ADJ. not filled closely; not selected unjustly, as an *unpacked* jury.

UNPAID, a. *ŭn-pād':* not paid, applied to one who performs the duties of an office gratuitously; not discharged, as a debt; not having received wages, as workmen. UNPAID FOR, a. taken on credit.

UNPAINED, a. *ŭn-pānd':* suffering no pain.

UNPAINTED, a. *ŭn-pānt'ĕd:* not painted.

UNPAIRED, a. *ŭn-pārd':* not paired or coupled.

UNPALATABLE, a. *ŭn-păl'ă-tă-bl:* not agreeable to the taste; not such as to be relished; disagreeable.

UNPARAGONED, a. *ŭn-păr'ă-gŏnd:* unequalled; unmatched.

UNPARALLELED, a. *ŭn-păr'ăl-lĕld:* having no parallel or equal; unequalled.

UNPARDONABLE, a. *ŭn-pâr'dn-ă-bl:* not to be forgiven; that cannot be remitted, as a sin. UNPAR'DONED, a. not granted forgiveness. UNPAR'DONING, a. not disposed to pardon or forgive.

UNPARLIAMENTARY, a. *ŭn-pâr'lĭ-mĕnt'ă-rĭ:* contrary to the usages or rules of parliament, or of a deliberative or legislative body. UNPAR'LIAMENT'ARINESS, n. *-nĕs*, the state of being unparliamentary.

UNPARTED, a. *ŭn-pârt'ĕd:* not separated; not divided.

UNPATENTED, a. *ŭn-păt'ĕnt-ĕd:* not granted or secured by a patent.

UNPATHED, a. *ŭn-pâthd':* untracked; untrodden; with no trace of a path.

UNPATHETIC, a. *ŭn'pă-thĕt'ĭk:* not pathetic; not adapted to excite emotion.

UNPATRIOTIC, a. *ŭn-pā'trĭ-ŏt'ĭk:* not patriotic.

UNPATRONIZED, a. *ŭn-pā'trō-nīzd':* not receiving countenance or friendly support.

UNPAVED, a. *ŭn-pāvd':* not paved, in *OE.*, emasculated.

UNPAY, v. *ŭn pā':* to undo.

UNPEACEABLE, a. *ŭn-pēs'ă-bl:* in *OE.*, quarrelsome; not peaceable.

UNPEG, v. *ŭn-pĕg':* to open a thing closed with a peg or pegs; to unloose.

UNPENETRATED, a. *ŭn-pĕn'ĕ-trā-tĕd:* not entered or pierced.

UNPENSIONED, a. *ŭn-pĕn'shŭnd:* not pensioned; not rewarded by a pension.

UNPEOPLE, v. *ŭn-pē'pl:* to deprive of inhabitants; to depopulate. UNPEO'PLED, a. depopulated; desolate.

UNPERCEIVABLE, a. *ŭn'pĕr-sēv'ă-bl:* that cannot be perceived, discerned, or observed. UNPERCEIV'ABLY, ad. UNPERCEIVED', a. not observed; not noticed.

UNPERFORATED, a. *ŭn-pĕr'fō-rā-tĕd:* not perforated; not penetrated by openings.

UNPERFORMED, a. *ŭn'pĕr-fawrmd':* not performed; not done or executed; not fulfilled. UNPERFORM'ING, a. not discharging its office.

UNPERJURED, a. *ŭn-pĕr'jûrd:* free from perjury.

UNPERPLEXED, a. *ŭn'pĕr-plĕkst':* not perplexed; not harassed; not complicated.

UNPERUSED, a. *ŭn'pē-rôzd':* not read.

UNPERVERTED, a. *ŭn'pĕr-vĕrt'ĕd:* not perverted; not wrested or turned to a wrong use or meaning.

UNPETRIFIED, a. *ŭn-pĕt'rĭ-fid:* not petrified; not converted into stone.

UNPHILOSOPHIC, or UN'PHILOSOPH'ICAL, a. *ŭn'fĭl-ō-sŏf'ĭk* or *-ĭ-kăl:* not according to the rules or principles of sound philosophy. UNPHIL'OSOPH'ICALLY, ad. UN'PHILOS'OPHIZE, v. to reduce from the status of a philosopher or reasoning being.

UNPHYSICKED, a. *ŭn-fĭz'ĭkt:* not physicked; without the aid of medicine.

UNPIERCED, a. *ŭn-pērst':* not pierced or penetrated.

UNPILLARED, a. *ŭn-pĭl'lērd:* deprived of pillars; without pillars.

UNPILLOWED, a. *ŭn-pĭl'lōd:* having no pillow; unsupported by a pillow.

UNPIN, v. *ŭn-pĭn':* to loose from pins; to unfasten.

UNPINKED, a *ŭn-pĭngkt':* in *OE.*, not marked with eyelet-holes; not pierced, as with a bodkin, sword, or the like.

UNPITIED, a. *ŭn-pĭt'ĭd:* not pitied; not compassionated; not regarded with sympathetic sorrow. UNPIT'IFUL, a. not pitiful; having no pity; not merciful. UNPIT'IFULLY, ad. UNPIT'YING, a. showing no compassion. UNPIT'EOUSLY, ad. without pity; mercilessly.

UNPLACED, a *ŭn-plāst':* not yet placed or located; not having a place, position, or office; disordered; uninvested.

UNPLAGUED, a. *ŭn-plāgd':* not tormented or harassed; not teased.

UNPLANTED, *ŭn-plănt'ĕd:* not planted; of spontaneous growth; not cultivated.

UNPLAUSIBLE, a. *ŭn-plawz'ĭ-bl:* not plausible; not having a fair appearance. UNPLAUS'IVE, a. *-ĭv*, in *OE.*, not applauding; disapproving.

UNPLEASANT, a. *ŭn-plĕz'ănt:* not pleasant; that does not afford pleasure; disagreeable. UNPLEAS'ANTLY, ad. UNPLEAS'ANTNESS, n. the state or quality of being unpleasant; an unpleasant circumstance or event; slight misunderstanding or quarrel. UNPLEAS'ING, a. offensive. UNPLEASED, a. *ŭn-plēzd'*, not pleased; not delighted. UNPLEAS'ING, a. not pleasing; offensive.

UNPLEDGED, a. *ŭn-plĕjd':* not pledged; not engaged by promise; not mortgaged.

UNPLIABLE, a. *ŭn plī'ă-bl*, or UNPLI'ANT, a.: not pliant; not easily bent; stiff; stubborn; not readily yielding.

UNPLIGHTED, a. *ŭn-plīt'ĕd:* not plighted or pledged.

UNPLOWED, or UNPLOUGHED, a. *ŭn-plowd':* not plowed.

UNPOETIC, a. *ŭn'pō-ĕt'ĭk*, or UN'POET'ICAL, a.: not poetical; destitute of the beauties of poetry; prosaic; unbecoming a poet. UN'POET'ICALLY, ad.

UNPOINTED, a. *ŭn-poynt'ĕd:* having no marks of punctuation; without point or purpose; dull; having no vowel-marks, as in Hebrew; having the points or tagged laces (of a garment) unfastened.

UNPOLARIZED, a. *ŭn-pō'lẽr-īzd:* lacking the property of pointing to the poles of the earth.

UNPOLICIED, a. *ŭn-pŏl'ĭ-sĭd:* without a policy or rational design; irrational.

UNPOLISHED, a. *ŭn-pŏl'ĭsht:* not polished; not refined in manners; rude; rough.

UNPOLITE, a. *ŭn'pō-līt':* not refined in manners; not civil or courteous; rude. UN'POLITE'LY, ad. in an uncivil or rude manner. UN'POLITE'NESS, n. want of refinement in manners; rudeness.

UNPOLLED, a. *ŭn-pōld':* not registered, as a vote at an election; not having voted; in *OE.*, unplundered.

UNPOLLUTED, a. *ŭn'pŏl-lōō'tĕd:* not defiled or corrupted.

UNPOPULAR, a. *ŭn-pŏp'ū-lẽr:* not having the public favor; not pleasing or in favor with the people. UNPOPULARLY, ad. UNPOP'ULAR'ITY, n. *-lăr'ĭ-tĭ,* state of not pleasing the people.

UNPORTABLE, a. *ŭn-pōrt'ă-bl:* that cannot be carried.

UNPORTIONED, a. *ŭn-pōr'shŭnd:* without a marriage portion.

UNPOSSESSED, a. *ŭn'pŏz-zĕst':* not held; not occupied. UN'POSSESS'ING, a. in *OE.*, having no possession.

UNPOTABLE, a. *ŭn-pō'tă-bl:* not drinkable.

UNPRACTICED, a. *ŭn-prăk'tĭst:* not skilled; without experience; raw.

UNPRECEDENTED, a. *ŭn-prĕs'ĕ-dĕnt'ĕd:* having no precedent: not justified by the authority of a former example. UNPREC'EDENT'EDLY, ad.

UNPRECISE, a. *ŭn'prĕ-sīs':* not precise; not exact.

UNPREDICT, v. *ŭn'prĕ-dĭkt':* in *OE.*, to recall or nullify a prediction.

UNPREGNANT, a. *ŭn-prĕg'nănt:* not pregnant; not prolific, as in new or striking thoughts; not quick of wit.

UNPREJUDICED, a. *ŭn-prĕj'û-dĭst:* not prejudiced; free from bias or prepossession; impartial; not preoccupied by opinion.

UNPRELATICAL, a. *ŭn'prĕ-lăt'ĭ-kăl:* unbecoming a prelate.

UNPREMEDITATED, a. *ŭn'prĕ-mĕd'ĭ-tā-tĕd:* not previously prepared in the mind; not done by design; not previously intended.

UNPREPARED, a. *ŭn'prĕ-pārd':* not prepared; not ready; not fitted or furnished by previous measures. UN'PREPAR'EDNESS, n. state of being unprepared.

UNPREPOSSESSED, a. *ŭn-prē'pŏz-zĕst':* not biased by previous opinions; not partial. UNPRE'POSSESS'ING, a. not having a winning or attractive appearance.

UNPRESENTABLE, a. *ŭn'prĕ-zĕnt'ă-bl:* not present able; not fit to be presented or introduced to another, or into society.

UNPRESSED, a. *ŭn-prèst':* not pressed; not forced.

UNPRESUMING, a. *ŭn'prĕ-zūm'ĭng:* not too confident or bold; modest; retiring.

UNPRESUMPTUOUS, a. *ŭn'prĕ-zŭm'tū-ŭs:* not presumptuous or rash; modest; submissive.

UNPRETENDING, a. *ŭn'prē tĕnd'ĭng:* not claiming distinction; modest.

UNPREVAILING, a. *ŭn'prĕ-vāl'ĭng:* of no force; useless.

UNPREVENTABLE, a. *ŭn'prĕ-vĕnt'ă-bl:* not preventable. UN'PREVENT'ED, a. not hindered; in *OE.*, not preceded by anything.

UNPRIESTLY, a. *ŭn-prēst'lĭ:* unsuitable to, or unbecoming, a priest.

UNPRINCELY, a. *ŭn-prĭns'lĭ:* unbecoming a prince.

UNPRINCIPLED, a. *ŭn-prĭn'sĭ-pld:* having no settled principles; destitute of virtue; vicious; wicked.

UNPRINTED, a. *ŭn-prĭnt'ĕd:* not printed, as a literary work; not stamped, as cotton goods.

UNPRIVILEGED, a. *ŭn-prĭv'ĭ-lĕjd:* not privileged.

UNPRIZED, a. *ŭn-prīzd':* not valued; in *OE.*, priceless. UNPRIZ'ABLE, a. *-ă-bl*, in *OE.*, incapable of being prized; not of much value; also, invaluable.

UNPROCLAIMED, a. *ŭn'prō-klāmd':* not proclaimed.

UNPROCURABLE, a. *ŭn'prō-kūr'ă-bl:* not obtainable.

UNPRODUCTIVE, a. *ŭn'prō-dŭk'tĭv:* barren; not producing profit or interest, as money, labor, etc.; ineffective. UN'PRODUC'TIVELY, ad. UN'PRODUC'TIVENESS, n. state of being unproductive.

UNPROFANED, a. *ŭn'prō-fānd':* not profaned; not violated.

UNPROFESSIONAL, a. *ŭn'prō-fĕsh'ŭn-ăl:* not belonging to a profession; not in keeping with the rules or usage of a profession. UN'PROFES'SIONALLY, ad.

UNPROFITABLE, a. *ŭn-prŏf'ĭt ă-bl:* producing no improvement or advantage; useless; resulting in no profit, advantage or gain; serving no purpose. UNPROF'ITABLY, ad. UNPROF'ITABLENESS, n. state of producing no gain or advantage; uselessness. UNPROF'ITED, a. *-ĭ tĕd*, having no gain.

UNPROGRESSIVE, a. *ŭn'prō-grĕs'sĭv:* not progressive.

UNPROHIBITED, a. *ŭn'prō-hĭb'ĭ-tĕd:* not forbidden; hence, lawful.

UNPROJECTED, a. *ŭn'prō-jĕkt'ĕd:* not planned; not formed in the mind.

UNPROLIFIC, a. *ŭn'prō-lĭf'ĭk:* barren; not producing fruit.

UNPROMISING, a. *ŭn-prŏm'ĭs-ĭng:* not affording a favorable prospect of success.

UNPROMPTED, a. *ŭn-prŏmt'ĕd:* not prompted; not dictated or instigated.

UNPRONOUNCEABLE, a. *ŭn'prō-nowns'ă-bl:* that cannot be pronounced; unspeakable. UN'PRONOUNCED', a. not uttered by the mouth.

UNPROPER, a. *ŭn-prŏp'ĕr:* improper. UNPROP'ERLY, ad. *-lĭ*, improperly.

UNPROPHETIC, a. *ŭn'prō-fĕt'ĭk:* not prophetic; lacking the faculty of foreseeing future events; also UN'PROPHET'ICAL, a. *-ĭ-kăl.*

UNPROPITIATED, a. *ŭn'prō-pĭsh'ĭ-ā-tĕd:* not propitiated; not conciliated; not reconciled. UN'PROPI'TIOUS, a. not propitious; not favorable; not disposed to promote. UN'PROPI'TIOUSLY, ad. UN'PROPI'TIOUSNESS, n. the state of being unpropitious.

UNPROPORTIONED, *ŭn'prō-pōr'shŭnd:* not proportioned; disproportionate.

UNPROPPED, a. *ŭn-prŏpt:* not propped or supported; not upheld.

UNPROSPEROUS, a. *ŭn-prŏs'pĕr-ŭs:* not prosperous; not attended with success; unfortunate. UNPROS'PEROUSLY, ad.

UNPROTECTED, a. *ŭn'prō-tĕkt'ĕd:* not protected; not supported or defended; not shielded or covered from danger. UN'PROTECT'ING, a. not shielding from danger.

UNPROTRACTED, a. *ŭn'prō-trăkt'ĕd:* not protracted.

UNPROVED, a. *ŭn-prōvd':* not proved; not established as true; not tried. UNPROVABLE, a. not capable of proof or demonstration.

UNPROVIDED, a. *ŭn'prō-vīd'ĕd:* not provided; unfurnished; unsupplied. UN'PROVIDE', v. *-vīd'*, in *OE.*, to divest or deprive of resolution; to unfurnish.

UNPROVOKED, a. *ŭn'prō-vōkt':* not provoked; not proceeding from a just cause; not incited. UN'PROVOK'ING, a. giving no offense.

UNPRUNED, a. *ŭn-prōnd':* not pruned; not cut; not lopped.

UNPUBLISHED, a. *ŭn-pŭb'lĭsht:* not published, as a book; not made public; not given to the public; private.

UNPUNCTUAL, a. *ŭn-pŭngk'tū-ăl:* not punctual.

UNPUNISHED, a. *ŭn-pŭn'ĭsht:* suffered to pass without punishment, or with impunity.

UNPURCHASABLE, a. *ŭn-pėr'chās-ă-bl:* that cannot be purchased. UNPUR'CHASED, a. not bought.

UNPURGED, a. *ŭn-pėrjd:* not purified; not purged.

UNPURIFIED, a. *ŭn-pū'rĭ-fīd:* not purified; not freed from foul matter; unsanctified.

UNPURPOSED, a. *ŭn-pėr'pŭst:* not designed; not intentional.

UNPURSUED, a. *ŭn'pėr-sūd':* not followed; not prosecuted.

UNQUALIFIED, a. *ŭn-kwŏl'ĭ-fid:* not qualified; destitute of the requisite talents or accomplishments; not having taken the requisite oaths or provided the required bond or security; not modified by conditions or exceptions. UNQUALIFY, v. to disqualify.

UNQUALITIED, a. *ŭn-kwŏl'ĭ-tĭd:* in *OE.*, deprived of the usual qualities or faculties.

UNQUEEN, v. *ŭn-kwēn':* to divest of the dignity of queen.

UNQUELLED, a. *ŭn-kwĕld':* not subdued.

UNQUENCHABLE, a. *ŭn-kwĕnsh'ă-bl:* that will never be, or cannot be, extinguished. UNQUENCH'ABLENESS, n. UNQUENCH'ABLY, ad. UNQUENCHED', a. *-kwĕnsht*, not extinguished.

UNQUESTIONABLE, a. *ŭn-kwĕst'yŭn-ă-bl:* not to be doubted; certain; in *OE.*, impatient under questioning; averse to being questioned or spoken to. UNQUEST'IONABLY, ad. without doubt. UNQUEST'IONED, a. not doubted; not examined; indisputable. UNQUEST'IONING, a. not doubting; trusting without reserve.

UNQUIET, a. *ŭn-kwī'ĕt:* not calm or tranquil; restless; troublesome. UNQUI'ETLY, ad. UNQUI'ETNESS, n. restlessness; want of peace; perturbation; uneasiness.

UNQUOTED, a. *ŭn-kwōt'ĕd:* not quoted; applied to commodities not in the prices current or sale-lists; not dealt in or recognized by the stock exchange, as certain kinds of shares or stocks.

UNRACKED, a. *ŭn-răkt':* not freed from the lees.

UNRAKED, a. *ŭn-rākt':* not raked; not raked up or together.

UNRANSACKED, a. *ŭn-răn'săkt:* not ransacked; not searched; in *OE.*, not pillaged.

UNRANSOMED, a. *ŭn-răn'sŭmd:* not ransomed; not liberated from captivity by a price paid.

UNRAVAGED, a. *ŭn-răv'ājd:* not wasted or destroyed.

UNRAVEL, v. *ŭn-răv'l:* to disentangle; to clear from complication or difficulty; to separate connected parts; to unfold; to fray. UNRAV'ELLING, imp. unfolding; clearing from difficulty. UNRAV'ELLED, pp. disentangled.

UNREACHED, a. *ŭn-rēcht':* not reached or attained to.

UNREAD, a. *ŭn-rĕd':* not read; not recited; not perused; not learned in books; illiterate; applied to a proof not examined by the reader or corrector of a printing-office. UNREAD'ABLE, a. *-rēd'ă-bl*, that cannot be read; not legible; not fit for, or worthy of, perusal.

UNREADY, a. *ŭn-rĕd'ĭ:* not ready; not prompt; not prepared; in *OE.*, unfit; ungainly; undressed. UNREAD'ILY, ad. not promptly; not cheerfully. UNREAD'INESS, n. want of readiness; want of preparation.

UNREAL, a. *ŭn-rē'ăl:* not real; not substantial; having appearance only. UN'REAL'ITY, n. want of real existence; that which is unreal or unsubstantial. UNRE'ALIZED, a. not accomplished; not carried out.

UNREAPED, a. *ŭn-rēpt':* not reaped.

UNREASONABLE, a. *ŭn-rē'zn-ă-bl:* exceeding the bounds of reason; immoderate; exorbitant; irrational. UNREA'SONABLY, ad. *-blĭ,* in a manner contrary to reason UNREA'SONABLENESS, n. state of being unreasonable; excess of demand, passion, and the like. UNREA'SONED, a. not derived from reason. UNREA'SONING, a. not exercising the faculty of reason; wanting reason. UNREA'SON, n want of reason.

UNREAVE, or UNREEVE, v. *ŭn-rēv':* to remove from a block or tackle, as to *unreave* a rope; to unwind; to disentangle.

UNREBUKED, a. *ŭn'rĕ-būkt':* not eproved or checked. UN'REBUK'ABLE, a. *-ă-bl,* incapable of being rebuked; blameless.

UNRECANTED, a. *ŭn'rĕ-kănt'ĕd:* not retracted.

UNRECEIVED, a. *ŭn'rĕ-sēvd':* not taken; not come into possession; not embraced, as opinions.

UNRECKONED, a. *ŭn-rĕk'nd:* not reckoned or enumerated.

UNRECLAIMED, a. *ŭn'rĕ-klāmd':* not reclaimed; not tamed; not reformed; not recovered, as land from a wild state. UN'RECLAIM'ABLE, a. not capable of being reclaimed; irreclaimable.

UNRECOGNIZABLE, a. *ŭn-rĕk'ŏg-nī'zā-bl:* that cannot be recognized; that cannot be acknowledged; that cannot be received as known. UNREC'OGNIZED, a. not acknowledged or known.

UNRECOMMENDED, a. *ŭn-rĕk'ŏm-mĕnd'ĕd:* not recommended.

UNRECOMPENSED, a. *ŭn-rĕk'ŏm-pĕnst:* not rewarded or compensated.

UNRECONCILABLE, a. *ŭn-rĕk'ŏn-sīl'ă-bl:* not to be reconciled or harmonized; not capable of being appeased; implacable. UNREC'ONCILED, a. *-sīld,* not reconciled or harmonized; not appeased; not having become favorable; not having made peace with.

UNRECORDED, a. *ŭn'rĕ-kawrd'ĕd:* not recorded; not registered; not kept in remembrance by some writing or monument.

UNRECOUNTED, a. *ŭn'rĕ-kownt'ĕd:* not related or told.

UNRECOVERABLE, a. *ŭn'rĕ-kŭv'ĕr-ă-bl:* that cannot be recovered or regained. UN'RECOV'ERED, a. not regained.

UNRECTIFIED, a. *ŭn-rĕk'tĭ-fīd:* not corrected. as an error; not refined, as spirits.

UNRECURING, a. *ŭn'rĕ-kūr'ĭng:* that cannot be cured; incurable.

UNREDEEMABLE a. *ŭn'rĕ-dēm'ă-bl.* that cannot be redeemed; that cannot be purchased back. UN'REDEEMED', a. not redeemed; not ransomed; not paid· not neutralized or counterbalanced.

UNREDRESSED, a. *ŭn'rĕ-drĕst':* not redressed.

UNREDUCED, a. *ŭn'rĕ-dūst':* not reduced, not lessened in size or amount. UN'REDU'CIBLE, a. that cannot be reduced or lessened in amount.

UNREEVE. see UNREAVE.

UNREFINED, a. *ŭn'rĕ-fīnd':* not refined, clarified, or freed from impurities; not polished in manners.

UNREFLECTING, a. *ŭn'rĕ-flĕkt'ĭng:* not reflecting; wanting in thought; inconsiderate.

UNREFORMED, a. *ŭn'rĕ-fawrmd':* not reformed, not reclaimed from vice; not amended; not corrected.

UNREFRACTED, a. *ŭn'rĕ-frăkt'ĕd:* not turned from a direct course, as rays of light.

UNREFRESHED, a. *ŭn'rĕ-frĕsht':* not refreshed; not relieved from fatigue; not cheered. UN'REFRESH'ING, a. not relieving from fatigue or weariness; not invigorating.

UNREFUTED, a. *ŭn'rĕ-fū'tĕd:* not refuted or proved to be false or wrong.

UNREGARDED, a. *ŭn'rĕ-gârd'ĕd:* not noticed; not heeded; neglected.

UNREGENERACY, a. *ŭn'rĕ-jĕn'ĕr-ă-sĭ:* state of being unrenewed in heart. UN'REGEN'ERATE, a., or UN'REGEN'ERATED, a. not renewed in heart; remaining at enmity with God.

UNREGISTERED, a. *ŭn-rĕj'ĭs-tĕrd:* not registered; not recorded.

UNREGRETTED, a. *ŭn rĕ-grĕt'tĕd:* not lamented.

UNREGULATED, a. *ŭn-rĕg'ū-lā-tĕd:* not regulated; not reduced to order.

UNREHEARSED, a. *ŭn'rĕ-hêrst':* not recited or repeated.

UNREINED, a. *ŭn-rānd':* not restrained by the bridle; not held in check.

UNRELATED, a. *ŭn'rĕ-lā'tĕd:* not related: not connected by blood or affinity.

UNRELAXING, a. *ŭn'rĕ-lăks'ĭng:* not abating in attention or severity.

UNRELENTING, a. *ŭn'rĕ-lĕnt'ĭng:* pitiless; inexorable; hard; cruel; inflexibly rigid. UN'RELENT'INGLY, ad.

UNRELIEVED, a. *ŭn'rĕ-lēvd':* not relieved, as soldiers on guard; not eased or delivered from pain; not delivered from distress. UN'RELIEV'ABLE, a. incapable of being relieved; admitting no succor.

UNREMARKED, a. *ŭn'rĕ-mârkt':* unobserved. UNREMARK'ABLE, not worthy of remark or notice.

UNREMEDIED, a. *ŭn-rĕm'ĕ-dĭd:* not remedied; not cured; not repaired. UNREME'DIABLE, a. *-rĕ-mē'dĭ-ă-bl,* irremediable; incapable of being remedied.

UNREMEMBERED, a. *ŭn'rĕ-mĕm'bĕrd:* not retained in the mind.

UNREMITTED, a. *ŭn'rĕ-mĭt'tĕd:* not remitted; not forgiven; not relaxed; not abated. UN'REMIT'TING, a. not remitting; not abating; incessant; continued. UN'REMIT'TINGLY, ad.

UNREMOVABLE, a. *ŭn'rĕ-mōv'ă-bl:* that cannot be displaced; fixed. UN'REMOV'ABLY, ad. *-blĭ*, in an unremovable manner. UN'REMOVED', a. not taken away; not capable of being removed.

UNRENEWED, a. *ŭn'rĕ-nūd':* not made anew; not renovated; unregenerate.

UNREPAID, a. *ŭn'rĕ-pād':* not repaid; not compensated.

UNREPAIRED, a. *ŭn'rĕ-pārd':* not repaired or mended.

UNREPEALED, a. *ŭn'rĕ-pēld':* not repealed or abrogated; remaining in force; not revoked.

UNREPEATED, a. *ŭn'rĕ-pēt'ĕd:* not done or spoken again.

UNREPENTANT, a. *ŭn'rĕ-pĕnt'ănt*, or UN'REPENT'ING, a.: not feeling sorrow or regret; not contrite. UN'REPENT'ED, a. not sorrowed for or regretted. UN'REPENT'ANCE, n. *-pĕnt'ăns*, in *OE.*, impenitence.

UNREPINING, a. *ŭn'rĕ-pīn'ĭng:* not peevishly murmuring or complaining. UN'REPIN'INGLY, ad.

UNREPLENISHED, a. *ŭn'rè-plĕn'ĭsht:* not refilled or adequately supplied.

UNREPORTED, a. *ŭn'rĕ-pōrt'ĕd:* not reported, as a speech; not yet officially made known; not yet published.

UNREPRESENTED, a. *ŭn-rĕp'rĕ-zĕnt'ĕd:* not represented; having no one to act in one's stead.

UNREPRESSED, a. *ŭn'rĕ-prĕst':* not crushed; not subdued. UN'REPRES'SIBLE, a. that cannot be put down or restrained; irrepressible.

UNREPRIEVABLE, a. *ŭn'rĕ-prēv'ă-bl:* that cannot be respited from death. UN'REPRIEVED', a. not respited.

UNREPROVABLE, a. *ŭn'rĕ-prōv'ă bl:* that cannot be justly blamed or censured; blameless. UN'REPROVED', a not liable to reproof or blame; not censured.

UNREQUITED, a. *ŭn'rĕ-kwī'tĕd:* not requited; not recompensed.

UNRESENTED, a. *ŭn'rĕ-zĕnt'ĕd:* not resented; not regarded with anger.

UNRESERVED, a *ŭn'rĕ-zĕrvd':* not reserved; not limited; not withheld in part; open; frank; free; full; concealing or withholding nothing. UN'RESERV'EDLY, ad. without limitation; frankly; without concealment. UN'RESERVE', n., or UN'RESERV'EDNESS, n. *-ĕd-nĕs*, frankness; openness.

UNRESIGNED, a. *ŭn'rĕ-zīnd':* not surrendered; not submissive.

UNRESISTED, a. *ŭn'rĕ-zĭst'ĕd:* not opposed; in *OE.*, that cannot be resisted; resistless. UN'RESIST'ING, a. not making resistance; submissive; humble. UN'RESIST'INGLY, ad.

UNRESOLVED, a. *ŭn'rĕ-zŏlvd':* not resolved; not determined; not cleared; not solved.

UNRESPECTED, a. *ŭn'rĕ-spĕkt'ĕd:* not honored or esteemed. UNRESPECT'ABLE, a. not respectable.

UNRESPITED, a. *ŭn rĕs'pĭt-ĕd:* not respited; in *OE.*, admitting no pause or intermission.

UNREST, n. *ŭn-rĕst':* disquiet; want of tranquillity. UNREST'ING, a. not tranquil; always moving or tossing about.

UNRESTORED, a. *ŭn'rĕ-stōrd':* not given back; not restored, as a building; not replaced in a former position; not having recovered health.

UNRESTRAINED, a. *ŭn'rĕ-strānd':* not restrained; not checked or repressed. UN'RESTRAINT', n. freedom from control.

UNRESTRICTED, a. *ŭn'rĕ-strĭkt'ĕd:* not limited.

UNRETURNED, a. *ŭn'rĕ-tĕrnd':* not brought or sent back; not restored; not come back.

UNREVEALED, a. *ŭn'rĕ vēld':* not revealed; not discovered; not disclosed.

UNREVENGED, a. *ŭn'rĕ-vĕnjd':* not revenged; not vindicated by just punishment. UN REVENGE'FUL, a. not disposed to revenge.

UNREVERED, a. *ŭn'rĕ-vērd':* not regarded with veneration. UNREV'ERENCED, a. not reverenced.

UNREVEREND, a. *ŭn-rĕv'ĕr-ĕnd*, or UNREV'ERENT, a. *-ĕnt:* irreverent.

UNREVERSED, a. *ŭn'rĕ-vĕrst':* not reversed; not repealed; not annulled by a counter-decision.

UNREVIEWED, a. *ŭn'rĕ-vūd':* not considered; not reviewed.

UNREVISED, a. *ŭn'rĕ-vīzd':* not revised; not altered and amended.

UNREVIVED, a. *ŭn rĕ-vīvd':* not revived; not recalled into life or force.

UNREVOKED, a. *ŭn'rĕ-vōkt':* not recalled or annulled.

UNREWARDED, a. *ŭn'rĕ-wawrd'ĕd:* not rewarded.

UNRIDDLE, v. *ŭn-rĭd'dl:* to solve or explain.

UNRIFLED, a. *ŭn-rī'fld:* not robbed or plundered; not grooved, as a gun.

UNRIG, v. *ŭn-rĭg':* to strip of rigging, as a ship. UNRIG'GING, imp. UNRIGGED', pp.

UNRIGHTEOUS, a. *ŭn-rīt'yŭs* or *-rī'chŭs:* not just; evil; wicked; contrary to the divine law; not right; dishonest. UNRIGHT'EOUSLY, ad. wickedly. UNRIGHT'EOUSNESS, n. a violation of the divine law; wickedness. UNRIGHTFUL, a. *ŭn-rīt'fŭl*, not rightful; not just. UNRIGHT', a. not right; unjust; wicked.

UNRIP, v. *ŭn-rĭp′:* to open seams; to separate or tear asunder, as clothes or sails; to rip.

UNRIPE, a. *ŭn-rīp′:* not mature; not complete; not brought to a state of perfection; too early. UNRIPENED, a. not matured. UNRIPE′NESS, n. immaturity.

UNRIVALLED, a. *ŭn-rī′vălld:* having no rival; having no equal; matchless.

UNRIVET, v. *ŭn-rĭv′ĕt:* to loose from rivets; to unfasten.

UNROBE, v. *ŭn-rōb′:* to strip of a robe; to undress. UNRO′BING, imp. UNROBED′, pp.

UNROLL, v. *ŭn-rōl′:* to undo or open out that which has been rolled; to display. UNROLL′ING, imp. UNROLLED′, pp.

UNROMANTIC, a. *ŭn′rō-măn′tĭk:* not romantic; not wild and fanciful; of a grave, sober, or matter-of-fact temperament. UN′ROMAN′TICALLY, ad.

UNROOF, v. *ŭn-rôf′:* to strip off the roof or covering of. UNROOF′ING, imp. UNROOFED′, pp.

UNROOSTED, a. *ŭn-rôst′ĕd:* driven from the roost.

UNROOT, v. *ŭn-rôt′:* to tear up by the roots; to extirpate. UNROOT′ED, pp. torn up by the roots.

UNROUGH, a. *ŭn-rŭf′:* smooth; hence, without a beard.

UNROUNDED, a. *ŭn-rownd′ĕd:* not shaped or cut to a round.

UNROUTED, a. *ŭn-rowt′ĕd:* not thrown into disorder; not defeated.

UNRUFFLED, a. *ŭn-rŭf′fld:* calm; tranquil; not agitated; not disturbed.

UNRULED, a. *ŭn-rôld′:* not governed; not directed by superior power. UNRU′LY, a. disregarding restraint; disposed to violate laws; disorderly; ungovernable; refractory. UNRU′LINESS, a. disregard of restraint; turbulence. UNRU′LIMENT, n. *-lĭ-mĕnt*, in *OE.*, turbulence.

UNRUMPLE, v. *ŭn-rŭm′pl:* to free from rumples; to open out.

UNSADDLE, v. *ŭn-săd′dl:* to take the saddle from UNSAD′DLED, a. not having a saddle on.

UNSAFE, a. *ŭn-sāf′:* not safe; not free from danger; exposed to harm or destruction. UNSAFE′LY, ad. not without danger. UNSAFE′NESS, n. or UNSAFE′TY, n. state of not being free from danger; insecurity.

UNSAID, a. *ŭn-sĕd′:* not spoken or uttered.

UNSAINTLY, a. *ŭn-sānt′lĭ:* not like or becoming a saint.

UNSALABLE, a. *ŭn-sāl′ă-bl:* not salable; not in demand; not meeting a ready sale; unfit for sale; unmerchantable. UNSAL′ABLENESS, n. the state of being unsalable.

UNSALTED, a. *ŭn-sawlt′ĕd:* not pickled with salt; fresh.

UNSALUTED, a. *ŭn'să-lō'tĕd:* not saluted; not addressed with expressions of kind wishes; not greeted.

UNSANCTIFIED, a. *ŭn-săngk'tĭ-fīd:* unholy; not consecrated.

UNSANCTIONED, a. *ŭn-săngk'shŭnd:* not ratified; not approved; not authorized.

UNSANITARY, a. *ŭn-săn'ĭ-tĕr-ĭ:* not sanitary; tending to promote disease.

UNSATED, a. *ŭn-sā'tĕd:* not satisfied; not glutted.

UNSATISFACTORY, a. *ŭn-săt'ĭs-făk'tĕr-ĭ:* not giving satisfaction; causing discontent. UN'SATISFAC'TORILY, ad. UN'SATISFAC'TORINESS, n. the state or quality of being unsatisfactory. UNSAT'ISFI'ABLE, a. that cannot be satisfied UNSAT'ISFIED, a. not satisfied; not gratified to the full; not content; not convinced; not paid. UNSAT'ISFYING, a. not yielding full gratification; not giving content.

UNSAVORY, a. *ŭn-sā'vĕr-ĭ:* having a bad taste or smell; tasteless; unpleasing; disgusting; offensive. UNSA'VORILY, ad. UNSA'VORINESS, n. the state of being unsavory; bad taste or smell.

UNSAY, v. *ŭn-sā':* to retract; to deny something formerly declared.

UNSCALABLE, a. *ŭn-skāl'ă-bl:* that cannot be scaled or climbed.

UNSCANNED, a. *ŭn-skănd':* not scanned; not examined with care; not measured.

UNSCARED, a. *ŭn-skârd':* not frightened away.

UNSCARRED, a. *ŭn-skârd':* not marked with scars or wounds.

UNSCATHED, a. *ŭn-skāthd':* uninjured.

UNSCATTERED, a. *ŭn-skăt'tĕrd:* not scattered; not dispersed or thrown into confusion.

UNSCEPTRED, a. *ŭn-sĕp'tĕrd:* having no sceptre or royal authority; deprived of sovereign power.

UNSCHOLARLY, a. *ŭn-skŏl'ĕr-lĭ:* not suitable to or becoming a scholar. UN'SCHOLAS'TIC, a. not pertaining to schools; not pedantic. UNSCHOOLED', a. not taught; illiterate.

UNSCIENTIFIC, a. *ŭn-sī'ĕn-tĭf'ĭk:* not according to the principles of science; not versed in science. UNSCI'ENTIF'ICALLY, ad.

UNSCORCHED, a. *ŭn-skŏrcht':* not injured by fire, as the skin.

UNSCOURED, a. *ŭn-skowrd':* not cleaned by rubbing.

UNSCRATCHED, a. *ŭn-skrăcht':* not scratched; not rubbed or torn on the surface; not cancelled or erased.

UNSCREENED, a. *ŭn-skrēnd':* not screened; not covered; not sheltered or protected; not sifted.

UNSCREW, v. *ŭn-skrō':* to loose from screws; to unfasten or detach by screwing the other way.

UNSCRIPTURAL, a. *ŭn-skrĭp'tū-răl:* not in harmony or accordance with the Scriptures; not warranted by the authority of God's Word. UNSCRIP'TURALLY, ad.

UNSCRUPULOUS, a. *ŭn-skrō'pū-lŭs:* having no scruples; not particular as to means employed; not restrained by conscience. UNSCRU'PULOUSLY, ad. UNSCRU'PULOUSNESS, n. the state or quality of being unscrupulous.

UNSCULPTURED, a. *ŭn-skŭlp'tūrd:* not engraved, not cut in stone.

UNSEAL, v. *ŭn-sēl':* to break or remove the seal of; to open. UNSEAL'ING, imp. UNSEALED', pp.: ADJ. opened by breaking the seal; having no seal; wanting ratification.

UNSEARCHABLE, a. *ŭn-sĕrch'ă-bl:* that cannot be explored or investigated. UNSEARCH'ABLY, ad. UNSEARCH'ABLENESS, n. the state or quality of being beyond the power of man to explore. UNSEARCHED', a. not searched; not explored; not critically examined. UNSEARCHING, a. not penetrating.

UNSEARED, a. *ŭn-sērd':* not seared: not hardened.

UNSEASONABLE, a. *ŭn-sē'zn-ă-bl:* not in the proper season or time; not in keeping with the season; beyond the usual time; unfit; ill-timed; late. UNSEA'SONABLY, ad. at the wrong time or season; inopportunely. UNSEA'SONABLENESS, n. the quality or state of being not in season. UNSEA'SONED, a. not accustomed; not kept till fit for use, as wood; not inured; not salted; without added condiment, relish, or seasoning; unformed; not qualified by use; in *OE.*, unseasonable.

UNSEAT, v. *ŭn-sēt':* to throw from one's seat, as in the saddle; to depose from a seat or representative position, as to *unseat* a member of parliament for bribery. UNSEAT'ED pp.: ADJ. having no seat or bottom. UNSEAT'ING, imp. throwing or expelling from a seat.

UNSEAWORTHY, a. *ŭn-sē'wĕr-thĭ:* not fit for a voyage, applied to a ship which in respect of its equipment, state of repair, the soundness of its timbers, the number and efficiency of its crew, etc., is unfit for encountering the ordinary perils of the sea. UNSEA'WORTHINESS, n. the state of being unseaworthy.

UNSECONDED, a. *ŭn-sĕk'ŭn-dĕd:* not supported by any one but the mover, as a proposition or motion; not aided; not backed; in *OE.*, not again exemplified.

UNSECRET, a. *ŭn-sē'krĕt:* not secret or close; not trusty.

UNSECTARIAN, a. *ŭn'sĕk-tā'rĭ-ăn:* not sectarian or denominational.

UNSECULAR, a. *ŭn-sĕk'ū-lĕr:* not worldly. UNSEC'ULARIZE, v. to detach from the things of this world; to devote to sacred uses.

UNSECURED, a. *ŭn'sĕ-kūrd':* not secured.

UNSEDUCED, a. *ŭn'sĕ-dūst':* not seduced; not drawn to evil.

UNSEEMLY, a. *ŭn-sēm'lĭ:* not seemly or becoming; not decent: AD. in an unbecoming manner; indecently. UNSEEM'LINESS, n. indecency; uncomeliness; impropriety.

UNSEEN, a. *ŭn-sēn':* not seen or observed; not discovered; invisible.

UNSELFISH, a. *ŭn-sĕlf'ĭsh:* not unduly attached to one's own interests. UNSELF'ISHLY, ad. UNSELF'ISHNESS, n.

UNSENT, a. *ŭn-sĕnt':* not sent; not transmitted.

UNSEPARATED, a. *ŭn-sĕp'ă-rā-tĕd:* not detached or parted. UNSEP'ARABLE, a. *-ăr-ă-bl:* inseparable; that cannot be parted or divided.

UNSEPULCHRED, a. *ŭn-sĕp'ŭl-kẻrd:* having no grave; unburied.

UNSERVICEABLE, a. *ŭn-sẻr'vĭs-ă-bl:* not serviceable; useless. UNSER'VICEABLENESS, n. uselessness.

UNSET, a. *ŭn-sĕt':* not placed; not planted; not sunk below the horizon.

UNSETTLE, v. *ŭn-sĕt'tl:* to unfix; to make uncertain or fluctuating; to disconcert; to disorder; to discompose; to become unsettled. UNSET'TLED, pp.: ADJ. unfixed; unhinged; not determined; not arranged or adjusted; unsteady or wavering; fickle; having no fixed place of abode; turbid; not occupied by permanent inhabitants. UNSET'TLING, imp. UNSET'TLEDNESS, n. the state of being unfixed or undetermined; uncertainty; want of fixity. UNSET'TLEMENT, n. unsettled state; irresolution.

UNSEVERED, a. *ŭn-sĕv'ẻrd:* not parted or divided.

UNSEX, v. *ŭn-sĕks':* to make otherwise than the sex commonly is; to deprive of qualities natural to the sex.

UNSHACKLE, v. *ŭn-shăk'l:* to unfetter; to undo or remove a shackle or shackles from; to set free. UNSHACK'LING, imp. UNSHACK'LED, pp. loosed from shackles or restraint.

UNSHADED, a. *ŭn-shā'dĕd:* not shaded, as a rough sketch; not shaded or obscured by having the light intercepted; not clouded. UNSHAD'OWED, a. *-shăd'ōd,* not darkened; not clouded.

UNSHAKEN, a. *ŭn-shā'kn:* not shaken; not agitated; not moved; not weakened in resolution; firm. UNSHAKED, pp. *ŭn-shākt',* in *O.E.*, unshaken.

UNSHAMED, a. *ŭn-shāmd':* not shamed.

UNSHAPE, v. *ŭn-shāp':* to deprive of shape; to confound; to throw into confusion. UNSHAPABLE, a. *ŭn shā'pă-bl,* that cannot be put into proper form. UNSHAPED', a., or UNSHA'PEN, a. deformed; ugly. UNSHAPE'LY, a. not well formed.

UNSHARED, a. *ŭn-shärd':* not shared.

UNSHAVED, a. *ŭn-shāvd':* not shaved.

UNSHEATHE, v. *ŭn-shēth':* to draw from the sheath or scabbard. UNSHEATH'ING, imp. UNSHEATHED', pp.

UNSHED, a. *ŭn-shĕd':* not shed; not spilled, as blood.

UNSHED, a. *ŭn-shĕd′:* not parted or divided, as the hair.

UNSHEETED, a. *ŭn-shēt′ĕd:* not covered with sheets or plates.

UNSHELTERED, a. *ŭn-shĕl′terd:* not sheltered; not defended from danger or annoyance; unscreened. UNSHEL′TERING, a. not protecting; not shielding from danger.

UNSHIELDED, a. *ŭn-shēld ĕd:* not shielded or protected; exposed.

UNSHIFTING, a. *ŭn-shĭft′ĭng:* not shifting; not changing place.

UNSHIP, v. *ŭn-shĭp′:* to remove from the place where it is settled or fixed, as to *unship* the tiller; also, to remove from a ship, as a cargo. UNSHIPPED′, pp. removed from its place in a ship.

UNSHOCKED, a. *ŭn-shŏkt′:* not shocked; not disgusted.

UNSHOD, a. *ŭn-shŏd′:* having no shoes.

UNSHORN, a. *ŭn-shōrn′:* not sheared or clipped.

UNSHOT, a. *ŭn-shŏt′:* not hit by shot; not discharged: V. to take the balls out of, as out of guns.

UNSHOUT, v. *ŭn-showt′:* in *OE.*, to retract what is agreed to by a shout.

UNSHOWERED, a. *ŭn-show′ĕrd:* not watered by showers of rain.

UNSHRINKING, a. *ŭn-shrĭngk′ĭng:* not shrinking; not withdrawing from danger or toil; not recoiling. UNSHRINK′INGLY, ad.

UNSHRIVEN, a. *ŭn-shrĭv′n:* not absolved, as by a confession of sins.

UNSHROUDED, a. *ŭn-shrowd′ĕd:* not shrouded; not covered; unveiled.

UNSHRUNK, a. *ŭn-shrŭngk′:* not contracted; not sponged, as cloth.

UNSHUNNED, a. *ŭn-shŭnd′:* not avoided. UNSHUN′NABLE, a. *-nă-bl,* that cannot be shunned; inevitable.

UNSHUT, a. *ŭn-shŭt′:* open; unclosed.

UNSIFTED, a. *ŭn-sĭft′ĕd:* not sifted; not separated by a sieve; untried.

UNSIGHTLY, a. *ŭn-sīt′lĭ:* disagreeable to the eye; deformed. UNSIGHT′LINESS, n. the state of being unsightly; ugliness.

UNSILVERED, a. *ŭn-sĭl′vėrd:* not covered with silver or quicksilver.

UNSINEWED, a. *ŭn-sĭn′ūd:* deprived of strength or force.

UNSINGED, a. *ŭn-sĭnjd′:* not singed; not scorched.

UNSINNING, a. *ŭn-sĭn′nĭng:* committing no sin; not tainted with sin.

UNSISTERLY, a. *ŭn-sĭs′tėr-lĭ:* not becoming a sister.

UNSIZED, a. *ŭn-sīzd′:* not sized or stiffened.

UNSKILFUL, a. *ŭn-skĭl'fûl:* wanting the knowledge and dexterity which are acquired by experience; clumsy. UNSKIL'FULLY, ad. UNSKIL'FULNESS, n. want of dexterity and readiness in action or execution, which are acquired by experience. UNSKILLED', a. destitute of practical knowledge. UNSKILLED LABOR, labor which involves no mental strain or skill.

UNSLACKENED, a. *ŭn-slăk'nd:* not slackened.

UNSLAKED, a. *ŭn-slākt':* not quenched, as thirst; not saturated with water, as lime.

UNSLEEPING, a. *ŭn-slēp'ĭng:* ever wakeful and watchful.

UNSLING, v. *ŭn-slĭng':* to unloose from slings or fastenings, as a swung cask.

UNSLIPPING, a. *un-slĭp'pĭng:* not liable to slip; fast.

UNSMIRCHED, a. *ŭn-smėrcht':* not polluted; not stained.

UNSMOKED, a. *ŭn-smōkt':* not smoked; not dried in smoke; not used in smoking, as a pipe.

UNSMOOTH, a. *ŭn-smôth':* not even; rough; not level. UNSMOOTHED', a. not made smooth or even.

UNSOCIABLE, a. *ŭn-sō-shă-bl:* lacking the qualities and manners which render one agreeable in society; lacking sociability; averse to or unfitted for society; reserved; not easy in conversation. UNSO'CIABLY, ad. not kindly; with reserve. UNSO'CIABLENESS, n., or UNSO'CIABIL'ITY, n. *-bĭl'ĭ-tĭ,* the state of being unsociable. UNSO'CIAL, a. not adapted by qualities and manners to be agreeable in society.

UNSOILED, a. *ŭn-soyld':* not soiled; not stained; unpolluted; not tainted.

UNSOLD, a. *ŭn-sōld':* not sold; not disposed of by sale.

UNSOLDIERLY, a. *ŭn-sōl'jėr-lĭ,* or UNSOL'DIERLIKE, a.: unbecoming a soldier.

UNSOLICITED, a. *ŭn'sō-lĭs'ĭ-tĕd:* not solicited; not requested; unasked. UN'SOLIC'ITOUS, a. not anxious; not very desirous.

UNSOLVED, a. *ŭn-sŏlvd':* not solved; not explained. UNSOL'VABLE, a. *-vă-bl,* that cannot be solved; inexplicable

UNSOPHISTICAL, a. *ŭn'sŏ-fĭs'tĭ-kăl:* not sophisticated; rustic; simple; ignorant. UN'SOPHIS'TICATED, a. genuine; pure; simple; not adulterated by admixture.

UNSORROWED, a. *ŭn-sŏr'rōd:* not lamented; not bewailed; with *for,* as a death *unsorrowed for.*

UNSORTED, a. *ŭn-sŏrt'ĕd:* not separated into kinds or classes; in *OE.,* ill chosen; ill arranged; unsuitable.

UNSOUGHT, a. *ŭn-sawt':* not sought; not requested; not solicited; not explored.

UNSOULED, a. *ŭn-sōld':* divested of soul or mind; without soul or honor

UNSOUND, a. *ŭn-sownd′:* not sound; defective; infirm; sickly; diseased; not orthodox; not solid; not real; not substantial; invalid; not fast under foot; not well established. UNSOUND′LY, ad. UNSOUND′NESS, n. the state of being unsound or defective; corruptness; want of solidity; want of orthodoxy; weakness or sickliness of body. UNSOUND′ED, a. not sounded; unfathomed; unfathomable. UNSOUND′ABLE, that cannot be fathomed.—SYN. of 'unsound': rotten; decayed; unorthodox; heterodox; dishonest; untrue; insincere; erroneous; wrong.

UNSOURED, a. *ŭn-sowrd′:* not made sour or morose.

UNSOWN, a. *ŭn-sōn′*, or UNSOWED′, a.: not sown, as land; not propagated by seed being scattered.

UNSPARING, a. *ŭn-spär′ĭng:* profuse; liberal; no parsimonious; not merciful. UNSPAR′INGLY, ad. in abundance; lavishly. UNSPARED′, a. *-spärd′*.

UNSPEAK, v. *ŭn-spēk′:* to retract; to unsay; to recant. UNSPEAKABLE, a. *ŭn spēk′ă-bl*, that cannot be spoken or uttered; that cannot be expressed in words; unutterable. UNSPEAK′ABLY, ad. in a manner or degree that cannot be expressed; unutterably.

UNSPECIFIED, a. *ŭn-spĕs′ĭ-fid:* not particularly mentioned.

UNSPECULATIVE, a. *ŭn-spĕk′ū-lā-tĭv:* not speculative; not given to forming theories; not apt to engage in trading ventures.

UNSPENT, a. *ŭn-spĕnt′:* not spent; not used or wasted; not exhausted; not deprived of its force, as an *unspent* ball.

UNSPHERE, v. *ŭn-sfēr′:* to remove from its orb.

UNSPIED, a. *ŭn-spīd′:* not seen; not discovered; not searched or explored.

UNSPILT, a. *ŭn-spĭlt′:* not spilled or shed.

UNSPIRITUAL, a. *ŭn-spĭr′ĭt-ū-ăl:* not spiritual; carnal. UNSPIR′ITUALIZE, v. *-īz*, to deprive of spirituality.

UNSPLIT, a. *ŭn-splĭt′:* not split; not riven or rent in length.

UNSPOILED, a. *ŭn-spoyld′:* not spoiled; not rendered useless; not corrupted; not plundered.

UNSPOKEN, a. *ŭn-spō′kn:* not spoken or uttered.

UNSPOTTED, a. *ŭn-spŏt′tĕd:* not spotted or stained; untainted with guilt; unblemished; immaculate; pure. UNSPOT′TEDNESS, n. state of being free from stain or guilt.

UNSQUARED, a. *ŭn-skwärd′:* not formed with lines or right angles; undressed, as round or natural timber; not regular.

UNST, *ŭnst:* most n. of the Shetland Islands, lat. 60° 45′ n., 12 m. long, and 3½ m. in average breadth; 36 sq. m. The coast is much broken, and the headlands are rocky, mural, and lofty. Valuable minerals abound, and chromate of iron is an article of commerce. The island contains numerous tumuli, a chain of Scandinavian dunes, and the ruins of more than 20 ancient chapels. Fishing and agriculture are chief employments. Pop. 2,000.

UNSTABLE, a. *ŭn-stā'bl:* not steady; inconstant; irresolute; wavering. UNSTA'BLENESS, n. instability.

UNSTAID, a. *ŭn-stād':* not steady; volatile; mutable; unfixed. UNSTAID'NESS, n. *-nĕs,* volatile mind; uncertain motion.

UNSTAINED, a. *ŭn-stānd':* not dyed; not polluted; not dishonored.

UNSTAMPED, a. *ŭn-stămpt':* not stamped or impressed; not having a stamp, as a letter, deed, etc.

UNSTANCHED, a. *ŭn-stânsht':* not stanched; not stopped, as blood.

UNSTATE, v. *ŭn-stāt':* t divest of state or dignity.

UNSTATESMANLIKE, a. *ŭn-stāts'măn-līk:* not becoming a statesman.

UNSTATUTABLE, a. *ŭn-stăt'ū-tă-bl:* contrary to statute.

UNSTAUNCHED: same as UNSTANCHED.

UNSTAYED, a. *ŭn-stād':* not stopped or retarded.

UNSTEADFAST, a. *ŭn-stĕd'făst:* not fixed; not firm; inconstant.

UNSTEADY, a. *ŭn-stĕd'ĭ:* not constant; irresolute. changeable; mutable; variable; addicted to some vice. UNSTEAD'IED, a. not supported; not kept from shaking; UNSTEAD'ILY, ad. UNSTEAD'INESS, n. inconstancy; want of firmness; irresolution.

UNSTEEPED, a. *ŭn-stēpt':* not soaked.

UNSTIMULATED, a. *ŭn-stĭm'ū-lā-tĕd:* not stimulated; not excited to action or to more vigorous exertion.

UNSTINTED, a. *ŭn-stĭnt'ĕd:* not stinted; not restrained within certain limits.

UNSTIRRED, a. *ŭn-stĕrd':* not stirred; not agitated.

UNSTOOPING, a. *ŭn-stōp'ĭng:* not stooping; not bending; not yielding.

UNSTOP, v. *ŭn-stŏp':* to take out a stopper from: to free from being stopped; to open. UNSTOP'PING, imp. UNSTOPPED', pp.: ADJ. not meeting any resistance.

UNSTORED, a. *ŭn-stōrd':* not stored; not laid up for future use; not warehoused.

UNSTORMED, a. *ŭn-stawrmd':* not stormed; not taken by assault, as a fortified place.

UNSTRAINED, a. *ŭn-strānd':* not strained; easy; not forced; natural.

UNSTRAITENED, a. *ŭn-strāt'nd:* not straitened; not contracted.

UNSTRATIFIED, a. *ŭn-străt'ĭ-fīd:* in *geol.*, not stratified; not formed or arranged in layers or strata, but in amorphous masses.

UNSTRENGTHENED, a. *ŭn-strĕngth'nd:* not strengthened; not supported.

UNSTRING, v. *ŭn-strĭng′:* to take strings from; to relax, as the strings of a musical instr.; to loosen, as the nerves; to take from a string, as beads; to untie. UNSTRINGED′, pp.: ADJ. not having strings. UNSTRING′ING, imp. UNSTRUNG′, pt. pp.

UNSTRUCK, a. *ŭn-strŭk′:* not struck; not impressed; not affected.

UNSTUDIED, a. *ŭn-stŭd′ĭd:* not premeditated or prepared beforehand; easy; natural; ignorant through neglect of study. UNSTUDIOUS, a. *ŭn-stū′dĭ-ŭs,* not diligent in study.

UNSTUFFED, a. *ŭn-stŭft′:* not stuffed.

UNSUBDUED, a. *ŭn′sŭb-dūd′:* not brought into subjection; not conquered.

UNSUBMISSIVE, a. *ŭn′sŭb-mĭs′sĭv:* not yielding to the will or power of another; disobedient. UN′SUBMIS′SIVELY, ad.

UNSUBSCRIBED, a. *ŭn′sŭb-skrībd′:* not subscribed; not attested or agreed to by writing one's name beneath.

UNSUBSTANTIAL, a. *ŭn′sŭb-stăn′shăl:* not solid; not real; slight; flimsy. UN′SUBSTAN′TIALLY, ad. UN′SUBSTAN′TIAL′ITY, n. *-shĭ-ăl′ĭ-tĭ,* quality of being unsubstantial, or of having no real existence. UN′SUBSTAN′TIATED, a. not established by proof; not verified.

UNSUCCESSFUL, a. *ŭn′sŭk-sĕs′fŭl:* not successful; not accomplishing what was intended or expected: not fortunate. UN′SUCCESS′FULLY, ad. UN′SUCCESS′FULNESS, n. the state of being unsuccessful. UN′SUCCESS′, n. want of success.

UNSUCKED, a. *ŭn-sŭkt′:* not sucked.

UNSUFFERABLE, a. *ŭn-sŭf′fĕr-ă-bl:* intolerable; insufferable.

UNSUITABLE, a. *ŭn-sūt′ă-bl:* unfit; not adapted; improper. UNSUIT′ABLY, ad. UNSUIT′ABLENESS, n. the state of being unsuitable. UNSUIT′ED, a. not suited; not adapted. UNSUIT′ING, a. not fitting; not becoming.

UNSULLIED, a. *ŭn-sŭl′lĭd:* not stained; not tarnished; not disgraced.

UNSUNG, a. *ŭn-sŭng′:* not sung; not celebrated in verse.

UNSUNNED, a. *ŭn-sŭnd′:* not exposed to the sun; not thawed by the sun.

UNSUPPLANTED, a. *ŭn′sŭp-plănt′ĕd:* not supplanted; not displaced or undermined; not overthrown by stratagem.

UNSUPPLIED, a. *ŭn′sŭp-plīd′:* not supplied; not furnished with what is necessary.

UNSUPPORTABLE, a. *ŭn′sŭp-pōrt′ă-bl:* intolerable; such as cannot be endured; insupportable. UN′SUPPORT′ED, a. not upheld; not sustained; not seconded.

UNSUPPRESSED, a. *ŭn′sŭp-prĕst′:* not suppressed; not subdued; not extinguished.

UNSURE, a. *ŭn-sūr′:* not sure; not fixed, not certain UNSURED′, a. in *OE.*, not fixed or certain.

UNSURMOUNTABLE, a. *ŭn′sėr-mownt′ŭ-bl:* that cannot be overcome; insuperable; insurmountable.

UNSURPASSED, a. *ŭn′sėr-păst′:* not surpassed; not excelled; not exceeded.

UNSURRENDERED, a. *ŭn′sėr-rĕn′dėrd:* not surrendered.

UNSUSCEPTIBLE, a. *ŭn′sŭs-sĕp′tĭ-bl:* not susceptible.

UNSUSPECTED, a. *ŭn′sŭs-pĕkt′ĕd:* not suspected. UN′SUSPECT′ING, a unsuspicious; not imagining that any ill is designed. UN′SUSPECT′INGLY, ad. UNSUSPECT′, a. OE. for UNSUSPECTED.

UNSUSPENDED, a. *ŭn′sŭs-pĕnd′ĕd:* not hung up; not suspended, intermitted, or delayed.

UNSUSPICIOUS, a. *ŭn′sŭs-pĭsh′ŭs:* not inclined to mistrust others; not imagining evil in others; not to be suspected, as evidence. UN′SUSPI′CIOUSLY, ad. not in such a way as to imagine evil in others; without suspicion. UNSUSPI′CION, n. *-pĭsh′ŭn,* absence of suspicion.

UNSUSTAINABLE, a. *ŭn′sŭs-tān′ă-bl:* that cannot be maintained. UN′SUSTAINED′, a. not supported. UN′SUSTAIN′ING, a. not sustaining; not keeping from falling.

UNSWATHE, v. *ŭn-swāth′:* to free, as from the encircling folds of bandages.

UNSWAYED, a. *ŭn swād′:* not swayed; not controlled or influenced; not biassed. UNSWAY′ABLE, a. *-ă-bl,* that cannot be swayed or influenced; not to be governed.

UNSWEAR, v. *ŭn-swär′:* to retract or recant by an oath.

UNSWEET, a. *ŭn-swēt′:* not sweet; disagreeable.

UNSWEPT, a. *ŭn-swĕpt′:* not swept; not cleaned with a broom.

UNSWERVING, a. *ŭn-swėrv′ĭng:* not swerving or deviating from a direct course; constant. UNSWERV′INGLY, ad.

UNSWORN, a. *ŭn-swōrn′:* not bound by an oath; not having taken an oath.

UNSWUNG, a. *ŭn-swŭng′:* not suspended.

UNSYMMETRICAL, a. *ŭn′sĭm-mĕt′rĭ-kăl:* lacking symmetry or due proportion of parts.

UNSYSTEMATIC, a. *ŭn-sĭs′tĕm-ăt′ĭk,* or UNSYS′TEMAT′ICAL, a.: not systematic; without regular order or arrangement of parts.

UNTAINTED, a. *ŭn-tānt′ĕd:* not tainted or rendered impure by admixture of foul matter; not stained; unblemished. UNTAINT′EDLY, ad. UNTAINT′EDNESS, n. the state of being untainted.

UNTAINTED, a. *ŭn-tānt′ĕd:* in *OE.*, not attainted.

UNTAKEN, a. *ŭn-tā′kn:* not taken; not captured or reduced: not subdued; not swallowed.

UNTAMABLE, a. *ŭn-tā'mă-bl:* not tamable; that can not be reclaimed from a wild state. UNTAMED', a. not reclaimed from wildness; not domesticated; not brought under control.

UNTANGLE, v. *ŭn-tăng'gl:* to loose from intricacy or a knotty condition: to disentangle.

UNTARNISHED, a. *ŭn-târ nĭsht:* not soiled; not stained, unblemished.

UNTASTED, a. *ŭn-tāst'ĕd:* not tasted; not tried by the sense of taste or by the tongue; not experienced. UNTAST'ING, a. not tasting; not perceiving by the taste.

UNTAUGHT, a. *ŭn-tawt':* not taught; not instructed, unlettered; unskilled; ignorant.

UNTAXED, a. *ŭn-tăkst':* not charged with taxes; not accused.

UNTEACHABLE, a. *ŭn-tēch'ă-bl:* that cannot be taught or instructed. UNTEACH', v. to cause to forget what has been taught; to cause to be forgotten.

UNTEMPERED, a. *ŭn-tĕm'pĕrd:* not tempered; not duly mixed for use; rigorous.

UNTEMPTED, a. *ŭn-tĕm'tĕd:* not tempted; not tried by enticements or persuasions. UNTEMPT'ING, a. not adapted to tempt or allure.

UNTENABLE, a. *ŭn-tĕn'ă-bl:* that cannot be held in possession; not defensible.

UNTENANTABLE, a. *ŭn-tĕn'ănt-ă-bl:* not in suitable repair for a tenant; not fit for habitation. UNTEN'ANTED, a. not occupied, as a house.

UNTENDED, a. *ŭn-tĕn'dĕd:* not tended; not attended to or cared for; not having an attendant.

UNTENDER, a. *ŭn-tĕn'dĕr:* not soft; lacking in sensibility or affection.

UNTENDERED, a. *ŭn-tĕn'dĕrd:* not offered.

UNTENT, v. *ŭn-tĕnt':* in *OE.*, to bring out of a tent; to deprive of the shelter of a tent. UNTENTED, a. *ŭn-tĕnt'ĕd*, without the shelter of a tent; not covered with tents.

UNTENTED, a. *ŭn-tĕnt'ĕd* [see TENT 1]: having no lint or medical dressings applied.

UNTERRIFIED, a. *ŭn-tĕr'rĭ-fīd:* not affrighted or daunted.

UNTERWALDEN, *ûn-tĕr-vâl'dĕn:* one of the four Forest Cantons of Switzerland; part of the Hill Country which surrounds the Lake of Lucerne (see SWITZERLAND); 25 m. in length. U. is bounded e., s., and w. by lofty hills, and subsidiary ridges divide it into two parallel valleys—both of which open on the north into the Lake of Lucerne. The e. valley is drained by the Engelberger Aa. the w. by the Sarner Aa. Great highways run up these valleys from the shores of the lake, connecting with each other; but not connecting U. with surrounding cantons. The canton is chiefly pastoral. Attempts to cultivate the vine have not been successful. The language of the people is a Swiss-

German dialect; their religion is Roman Catholic. Unterwalden is divided into two parts; not, however, corresponding with the two river basins of which it is formed. The forest of Kerns, or Kernwald, formed the line of separation between these two districts as early as 1150. One is named Obwald, or district above the Forest, and includes the whole w. valley. The other is the Nidwald, including only the lower part of the e. valley. Each division forms an independent republic, with its own administration. Both have a *landesgemeinde,* or parliament, composed of all the inhabitants 20 years of age, except a few *heimathlosen* (tramps); and each forms a half-canton, i.e., a canton which returns one member to the Swiss council of state. The capital of the Nidwald is Stanz. The capital of the Obwald is Sarnen. Pop. of Unterwalden (1900) 28,330.

UNTESTED, a. *ŭn-tĕst'ĕd:* not tested or proved; not tried by a standard.

UNTHANKED, a. *ŭn-thăngkt':* not thanked; not repaid with acknowledgments. UNTHANK'FUL, a. not making acknowledgments for favors received; ungrateful. UNTHANK'FULLY, ad. UNTHANK'FULNESS, n. neglect of acknowledgments for good received; ingratitude.

UNTHAWED, a. *ŭn-thawd':* not melted or dissolved.

UNTHEORETICAL, a. *ŭn-thē'ō-rĕt'ĭ-kăl:* not depending on theory or speculation.

UNTHINK, v. *ŭn-thĭngk':* to recall or dismiss in thought; dismiss from the mind. UNTHINKING, a. *ŭn-thĭngk'ĭng,* thoughtless; inconsiderate. UNTHINK'INGLY, ad. UNTHOUGHT'FUL, a. inconsiderate; heedless. UNTHOUGHT'-OF, a. not thought of; not regarded.

UNTHREAD, v. *ŭn-thrĕd':* to draw a thread from, as to *unthread* a needle; to loose; relax.

UNTHREATENED, a. *ŭn-thrĕt'nd:* not threatened or menaced.

UNTHRIFT, n. *ŭn'thrĭft:* lack of thrift; extravagance; prodigality; one who wastes his substance by extravagance: ADJ. *ŭn-thrĭft',* in *OE.,* prodigal; profuse. UNTHRIFT'Y, a. prodigal; lavish; profuse; wasteful. UNTHRIFT'ILY, ad. UNTHRIFT'INESS, n. the state of being unthrifty.

UNTHRONE, v. *ŭn-thrōn':* to pull down from a throne; to dethrone.

UNTIDY, a. *ŭn-tī'dĭ:* not tidy; not neatly dressed; not in good order. UNTI'DILY, ad. UNTI'DINESS, n. the state of being untidy; want of order or neatness.

UNTIE, v. *ūn-tī':* to undo, as a knot; to undo the fastenings or wrappings of; to free from a knot or any fastening; to unbind; to loosen; to disentangle. UNTIED', pp.: ADJ. not bound or gathered in a knot; not held by any fastening; set free from any bond.

UNTIL, prep. *ŭn-tĭl′* [OS. *und*, unto, and Ger. *ziel;* OHG. *zil;* Bohem. *cyl.* a bound, a limit, an end]: to; till; as far as, with respect to time, but in early English used also in respect of place: CONJ. as far as; to the point that; to the degree or time that.

UNTILLED, a. *ŭn-tĭld′:* not tilled or cultivated.

UNTIMBERED, a. *ŭn-tĭm′bĕrd:* not growing timber, as *untimbered* land; in *OE.*, not furnished with timber; weak.

UNTIMELY, a. *ŭn-tīm′lĭ:* not timely; inopportune; happening before the usual or natural time; premature· AD. before the natural or proper time. UNTIME′LINESS, n. the state of being untimely. UNTIME′OUS, a. *-ŭs*, untimely. UNTIME′OUSLY, ad.

UNTINCTURED, a. *ŭn-tĭngk′tūrd:* not impregnated with; not imbued with, as the mind.

UNTINGED, a. *ŭn-tĭnjd′:* not tinged; not stained; not discolored; not infected.

UNTIRED, a *ŭn-tīrd′:* not tired; not exhausted; not made weary. UNTIR′ING, a. not becoming weary or fatigued. UNTIR′INGLY, ad. UNTIR′ABLE, a. *-ă-bl*, in *OE.*, incapable of being tired; unwearied.

UNTITLED, a. *ŭn-tī′tld:* having no title or claim; having no title of honor, dignity, or office; lacking title, as an *untitled* person.

UNTO, prep. *ŭn′tû* [OS. and Goth. *und*, unto, and Eng. *to*]: to: now used only in formal or scriptural language.

UNTOLD, a. *ŭn-tōld′:* not told; not related; not revealed; not numbered, or that cannot be told or numbered.

UNTOUCHED, a. *ŭn-tŭcht′:* not touched; not hit; not moved or affected; not meddled with.

UNTOWARD, a. *ŭn-tō′ĕrd:* perverse; not easily guided or taught; troublesome; in *OE.*, awkward; ungraceful; in *prov. Eng.*, wild; fierce. UNTO′WARDLY, ad. in a froward or perverse manner: ADJ. perverse; awkward. UNTO′WARDNESS, n. perverseness; awkwardness.

UNTRACEABLE, a. *ŭn-trās′ă-bl:* that cannot be traced; that cannot be followed by footsteps or tracks. UNTRACED′, a. not traced; not marked out or delineated; not marked by footsteps.

UNTRACKED, a. *ŭn-trăkt′:* not tracked; not marked or followed by footsteps.

UNTRACTABLE, a. *ŭn-trăkt′ă-bl:* not tractable; not yielding to management; stubborn; rough; difficult. UNTRACT′ABLENESS, or UNTRACT′ABIL′ITY, n. *-bĭl′ĭ-tĭ*, the state or quality of being untractable; stubbornness.

UNTRAINED, a. *ŭn-trānd′:* not trained; not disciplined; not skilful; not educated.

UNTRANSCRIBED, a. *ŭn′trăn-skrībd′:* not copied; not written over again.

UNTRANSFERABLE, a. *ŭn′trăns-fĕr′ă-bl:* that cannot be passed to another. UN′TRANSFERRED′, a. not transferred; not conveyed or assigned to another.

UNTRANSLATABLE, a. *ŭn'trăns-lā'tă-bl:* not capable of being translated. UN'TRANSLA'TED, a. not translated.

UNTRANSMUTABLE, a. *ŭn'trăns-mū'tă-bl:* that cannot be transmuted or changed in nature or substance.

UNTRANSPORTED, a. *ŭn'trăns-pōrt'ĕd:* not transported; not conveyed from one place to another.

UNTRANSPOSED, a. *ŭn'trăns-pōzd':* not transposed; having the natural order.

UNTRAVELLED, a. *ŭn-trăv'ĕld:* not trodden by passengers; not having visited foreign countries.

UNTREAD, v. *ŭn-trĕd:* in *OE.*, to go back in the same steps; to tread back; retrace.

UNTREASURED, a. *ŭn-trĕzh'ûrd:* not laid up; in *OE.*, deprived of treasure.

UNTRIED, a. *ŭn-trīd':* not attempted; not tested or proved; without experience; inexperienced; not having passed trial; not heard and determined in a court of law.

UNTRIMMED, a. *ŭn-trĭmd':* not trimmed; not pruned or dressed, as a bush.

UNTRITURATED, a. *ŭn-trĭt'ū-rā'tĕd:* not reduced to powder.

UNTROD, a. *ŭn-trŏd'*, or UNTRODDEN, a. *ŭn-trŏd'n:* not passed over by persons; not marked by the feet.

UNTROUBLED, a. *ŭn-trŭb'ld:* not troubled; not disturbed by care or business; not agitated; not foul or turbid; transparent. UNTROUB'LEDNESS, n. state of being untroubled; indifference.

UNTRUE, a. *ŭn-trô':* contrary to the fact; false; not faithful or true to another. UNTRU'LY, ad. falsely.

UNTRUSSED, a. *ŭn-trŭst':* not trussed; not tied up.

UNTRUSTWORTHY, a. *ŭn-trŭst'wĕr-thĭ:* not deserving of confidence.

UNTRUSTY, a. *ŭn-trŭst'ĭ:* not trusty; not worthy of confidence; unfaithful. UNTRUST'INESS, n. the state of being untrusty. UNTRUST'ED, a. not confided in.

UNTRUTH, n. *ŭn-trôth':* falsity; a falsehood; something not in conformity to fact and reality; want of fidelity treachery. UNTRUTH'FUL, a. not truthful; having the habit of uttering falsehoods; not speaking the truth. UNTRUTH'FULLY, ad.

UNTUNABLE, a. *ŭn-tū'nă-bl:* that cannot be tuned; not harmonious; not musical. UNTU'NABLY, ad. UNTUNE, v. *ŭn-tūn'*, to make incapable of harmony; to disorder. UNTUNED', a. made incapable of producing harmonious sounds; discordant.

UNTURNED, a. *ŭn-tĕrnd':* not turned.

UNTUTORED, a. *ŭn-tū'terd:* uninstructed; untaught.

UNTWINE, v. *ŭn-twīn':* to unwind; to loose that which has been twined. UNTWINED'. a. untwisted; disentangled.

UNTWIST, v. *ŭn-twĭst′:* to separate that which has been twisted; to open; to disentangle; to untwine. UNTWIST′ING, imp. UNTWIST′ED, a. separated; opened.

UNURGED, a. *ŭn-ėrjd′:* not urged; not incited; not pressed with entreaty.

UNUSED, a. *ŭn-ūzd′:* not employed; not handled for some purpose; that has never been used; left over; not habituated or accustomed. UNUSE′FUL, a. unprofitable; useless. UNU′SUAL, a. not usual; not common. UNU′SUALLY, ad. UNU′SUALNESS, n. the state of being unusual or uncommon.

UNUTTERABLE, a. *ŭn-ŭt′ėr-ă-bl:* that cannot be expressed in words; that cannot be disclosed; unspeakable UNUT′TERABLY, ad.

UNVACATED, a. *ŭn-vā′kā-tĕd:* not made vacant.

UNVALUED, a. *ŭn-văl′ūd:* not valued; not appraised, not prized; neglected; in *OE.*, inestimable; above price.

UNVANQUISHED, a. *ŭn-văn′kwĭsht:* not overcome; not conquered.

UNVARIED, a. *ŭn-vā′rĭd:* not varied; not altered or diversified.

UNVARIEGATED, a. *ŭn-vā′rĭ-ĕ-gā-tĕd:* not variegated; not diversified.

UNVARNISHED, a. *ŭn-vär′nĭsht:* not varnished; not artificially colored or adorned; plain, as an *unvarnished* tale.

UNVARYING, a. *ŭn-vā′rĭ-ĭng:* that does not vary; not liable to change.

UNVEIL, v. *ŭn-vāl′:* to uncover; to disclose to view UNVEIL′ING, imp. UNVEILED′, pp.

UNVENERABLE, a. *ŭn-vĕn′ėr-ă-bl:* in *OE.*, not venerable or worthy of veneration or respect.

UNVENTILATED, a. *ŭn-vĕn′tĭ-lā-tĕd:* not ventilated not purified by a free current of air; not subjected to public discussion.

UNVERSED, a. *ŭn-vėrst′:* not skilled; unacquainted.

UNVEXED, a. *ŭn-vĕkst′:* untroubled; not annoyed or disturbed.

UNVINDICATED, a. *ŭn-vĭn′dĭ-kā-tĕd:* not vindicated.

UNVIOLATED, a. *ŭn-vī′ō-lā-tĕd:* not violated; not broken; not injured; not transgressed

UNVIRTUOUS, a. *ŭn-vėr′tū-ŭs:* wanting virtue.

UNVISITED, a. *ŭn-vĭz′ĭ-tĕd:* not visited; not resorted to; not frequent.

UNVITIATED, a. *ŭn-vĭsh′ĭ-ā-tĕd:* not vitiated; not corrupted; not injured in its substance or qualities.

UNVITRIFIED, a. *ŭn-vĭt′rĭ-fīd:* not converted into glass.

UNVOICED, a. *ŭn-voyst′:* not spoken or pronounced.

UNVOUCHED, a. *ŭn-vowcht′:* not affirmed or fully tested.

UNVOWED, a. *ŭn-vowd′:* not vowed; not consecrated by promise.

UNVOYAGEABLE, a. *ŭn-voy′ăj-ă-bl:* in *OE.*, that cannot be navigated, crossed, travelled, or passed over.

UNWAKENED, a. *ŭn-wā′knd:* not wakened; not roused from sleep or stupidity.

UNWALLED, a. *ŭn-wawld′:* not surrounded or protected by a wall.

UNWARES, ad. *ŭn-wärz′* [see AWARE and WARY]: unexpectedly; unawares.

UNWARILY, UNWARINESS: see under UNWARY.

UNWARLIKE, a. *ŭn-waw′līk:* not fit for war; not used to war; peace-loving.

UNWARMED, a. *ŭn-wawrmd′:* not warmed; not excited; not heated in a moderate degree.

UNWARNED, a. *ŭn-wawrnd′:* not cautioned; not previously admonished of danger.

UNWARP, v. *ŭn-wawrp′:* to reduce from the state of being warped. UNWARPED′, a. not warped; not biased; impartial. UNWARP′ING, a. unyielding; undeviating.

UNWARRANTABLE, a. *ŭn-wŏr′răntă-bl:* not justifiable; unjust; improper. UNWAR′RANTABLY, ad. in a manner that cannot be justified. UNWAR′RANTABLENESS, n. the state of being unwarrantable. UNWAR′RANTED, a. not warranted; not authorized; not assured or certain; not guaranteed to be sound and perfect, or of a certain quality.

UNWARY, a. *ŭn-wā′rĭ:* not cautious; not vigilant against danger; in *OE.*, unforeseen; unexpected. UNWA′RILY, ad. without vigilance or caution; heedlessly. UNWA′RINESS, n. want of caution; carelessness.

UNWASHED, a. *ŭn-wŏsht′*, or UNWASH′EN, a.: not washed or cleansed by water. THE UNWASHED, or THE GREAT UNWASHED, the mob; the rabble.

UNWASTED, a. *ŭn-wāst′ĕd:* not lost by extravagance or negligence; not lost by preventable means. UNWAST′ING, a. *-ing*, not growing less; not decaying.

UNWATCHED, a. *ŭn-wŏcht′:* not watched: not guarded. UNWATCH′FUL, a. not watchful; not vigilant. UNWATCH′FULNESS, n. want of caution or vigilance.

UNWATERED, a. *ŭn-waw′tĕrd:* not watered, as by a river; not covered or wet with water; dry.

UNWAVERING, a. *ŭn-wā′vĕr-ĭng:* not unstable; not fluctuating; firm.

UNWEAKENED, a. *ŭn-wēk′nd:* not weakened; not enfeebled.

UNWEANED, a. *ŭn-wēnd′:* not weaned.

UNWEAPONED, a. *ŭn-wĕp′nd:* not furnished with weapons.

UNWEARIABLE, a. *ŭn wēr′ĭ-ă-bl:* that cannot be wearied or tired out. UNWEAR′IABLY, ad. UNWEAR′IED, a. not tired; not fatigued; that does not tire or sink under fatigue or exertion. UNWEAR′IEDLY, ad. UNWEAR′IEDNESS, n. state or quality of being unwearied. UNWEAR′Y, a. not tired.

UNWEAVE, v. *ŭn-wēv′:* to undo what has been woven.

UNWED, a. *ŭn-wĕd′*, or UNWED′DED, a.: unmarried; single.

UNWEDGEABLE, a. *ŭn-wĕj′ă-bl:* not easily split or cloven.

UNWEEDED, a. *ŭn-wēd′ĕd:* not cleared of weeds.

UNWEETING, a. *ŭn-wēt′ĭng* [AS. *un*, not; *witan*, to perceive, to know (see WIT)]: in *OE.*, unknowing; ignorant. UNWEET′INGLY, ad. OE. for UNWITTINGLY; ignorantly.

UNWEIGHED, a. *ŭn-wād′:* not weighed; not deliberately considered and examined; inconsiderate. UNWEIGH′ING, a. inconsiderate; thoughtless.

UNWELCOME, a. *ŭn-wĕl′kŭm:* not welcome; not well received; not pleasing. UNWEL′COMELY, ad. UNWEL′COMED, a. not willingly and gladly received.

UNWELL, a. *ŭn-wĕl′:* ailing; indisposed.

UNWEPT, a. *ŭn-wĕpt′:* not lamented; not mourned.

UNWHIPPED, a. *ŭn-hwĭpt′:* not corrected; not chastised.

UNWHOLESOME, a. *ŭn-hōl′sŭm:* not wholesome; unfavorable to health; injurious; corrupt; tainted. UNWHOLE′SOMENESS, n. state of being injurious to health.

UNWIELDY, a. *ŭn-wēld′ĭ:* moved with difficulty, bulky; ponderous. UNWIELD′ILY, ad. heavily; with difficulty. UNWIELD′INESS, n. difficulty of being moved.

UNWILLED, a. *ŭn-wĭld′:* not produced by the will; involuntary. UNWILL′ING, a. averse; reluctant; in *OE.*, unintentional; unwilled. UNWILL′INGLY, ad. UNWILL′INGNESS, n. disinclination; reluctance.

UNWIND, v. *ŭn-wīnd′:* to loose or separate what has been twisted or convolved; to untwist. UNWIND′ING, a. not turning round; not encircling. UNWOUND′, pp.

UNWIPED, a. *ŭn-wīpt′:* not wiped; not cleaned by rubbing.

UNWISE, a. *ŭn-wīz′:* not wise; lacking or not characterized by wisdom; not discreet and judicious. UNWIS′DOM, n. want of wisdom or discretion; foolishness; imprudence.

UNWISH, v. *ŭn-wĭsh′:* to undo by wishing; to wish that the thing which is should not be. UNWISHED, a. *ŭn-wĭsht′:* not sought; not desired.

UNWIST, a. *ŭn-wĭst′:* unthought of; not known.

UNWIT, v. *ŭn-wĭt′:* to deprive of understanding. UNWIT′TING, imp.: ADJ. ignorant; unaware; unconscious. UNWIT′TINGLY, ad. without knowledge or consciousness; ignorantly.

UNWITHERED, a. *ŭn-wĭth'ĕrd:* not withered or faded. UNWITH'ERING, a. not liable to wither.

UNWITNESSED, a. *ŭn-wĭt'nĕst:* not witnessed; not observed or seen by witnesses; not attested by witnesses; wanting testimony.

UNWITTY, a. *ŭn-wĭt'tĭ:* destitute of wit. UNWIT'TILY, ad.

UNWOMANLY, a. *ŭn-wûm'ăn-lĭ:* unbecoming a woman.

UNWONTED, a. *ŭn-wŭnt'ĕd:* unaccustomed; not made familiar by practice; unusual; uncommon. UNWONT'EDLY, ad. UNWONT'EDNESS, n. uncommonness; rareness. UNWONT', a. OE. for UNWONTED.

UNWOODED, a. *ŭn-wûd'ĕd:* destitute of trees.

UNWOOED, a. *ŭn-wôd':* not wooed or courted.

UNWORKMANLIKE, a. *ŭn-wėrk'măn-līk:* unlike or unbecoming a workman; unskilful.

UNWORLDLY, a. *ŭn-wėrld'lĭ:* not worldly. UNWORLD'LINESS. n. the state of being unworldly.

UNWORN, a. *ŭn-wōrn':* not worn or impaired.

UNWORSHIPPED, a. *ŭn-wėr'shĭpt:* not worshipped or adored.

UNWORTHY, a. *ŭn-wėr'thĭ:* not worthy or deserving; destitute of merit; unbecoming; base; unmerited. UNWOR'THILY, ad. not worthily; without due regard to merit. UNWOR'THINESS, n. the state of being unworthy; want of merit.

UNWOUNDED, a. *ŭn-wônd'ĕd:* not wounded; not hurt: not injured.

UNWOVEN, a. *ŭn-wō'vn:* not woven.

UNWRAP, v. *ŭn-răp':* to open what is folded; unfold; undo the wrappings of.

UNWREATHE. v. *ŭn-rēth':* to untwist; to untwine.

UNWRENCHED, a. *ŭn-rĕnsht':* not wrenched; not strained or distorted.

UNWRINKLED, a. *ŭn-rĭng'kld:* not wrinkled; not shrunk into furrows and ridges.

UNWRITTEN. a. *ŭn-rĭt'tn:* not reduced to writing; verbal; blank. UNWRITTEN LAW, the common law, or that law which has been established by usage—as opposed to the 'written' or 'statute law;' law which is based on custom or judicial decisions.

UNWROUGHT, a. *ŭn-rawt':* not wrought; not labored; not manufactured.

UNWRUNG, a. *ŭn-rŭng':* not pinched.

UNYIELDED, a. *ŭn-yēld'ĕd:* not yielded; not allowed; not given up; not conceded. UNYIELD'ING, a. unbending; unpliant; stiff; obstinate. UNYIELD'INGLY, ad.

UNYOKE, v. *ŭn-yōk':* to loose from or free from a yoke; in *OE.*, to disjoin. UNYOK'ING, imp. UNYOKED', pp.: ADJ. freed from the yoke; not having worn the yoke; in *OE.*, unrestrained.

UNZEALOUS, a. *ŭn-zĕl'ŭs:* not zealous or enthusiastic.

UP, ad. *ŭp* [AS. *up, upp,* up: Dan. and Dut. *op;* Icel. and Sw. *upp;* Goth. *iup;* Ger. *auf,* up, over, on, upon]: in, toward, or to a high or more elevated place or position; aloft; on high; above the horizon; in a state of advance; in, to, or at a state or point of equal advance, as to catch *up* in a race, to keep *up* with the times; in progress, as, what's *up* now?; in a state of being raised or increased; in a state of climbing or ascending; in a state of insurrection; in a state of elevation; in a state of excitement; out of bed; into order, as, he drew *up* his company; from youth to age; at an end, as, it is all *up* with him now: *up* is much used in modifying the action of a verb: PREP. from a lower to a higher position on, as to climb *up* a tree; to or toward the source, head, or important part of, as to sail *up*-stream INT. or IMPERA. arise; rouse up. UP AND DOWN, in a vertical position or direction; upright; backward and forward; from one place to another; here and there. UP-BY, in *Scot.*, up to or at a place not far off. UP LINE, a line of railway leading to any principal terminus. UP TO, to an equal height or degree; fully prepared for. UP TO THE MARK, UP TO THE KNOCKER, in *slang*, gratifying; satisfactory; excellent. UP TO SNUFF, in *slang*, fully aware of the scent; alive to one's own interest; wide-awake. UP TO TRAP (see under TRAP 1). UP-STREAM, from the mouth toward its head; against the current; opposed to *down-stream*, with the current. UP-TRAIN (see under TRAIN). UP THE COUNTRY, in a direction from the coast, or up a river. THE UPS AND DOWNS OF LIFE, the various changes of good and bad fortune, or the joys and sorrows of life. UP WITH, denoting the act of erecting, or raising to give a blow. ALL UP WITH, all over with. THE TIME IS UP, the allotted time is past. TO BLOW UP, to inflate; to destroy by mining or from below; to reprove sharply. TO COME UP WITH, to reach in following. TO GROW UP, to come to maturity. DONE UP, put in order; dressed for use; exhausted.

UPANISHAD, *û-păn'ĭ-shăd,* mod. Hind. *û-păn'ĭ-shŭd:* one of a series of speculative treatises belonging to the Vedic literature which contain the mystical doctrine of the Hindus on the nature of a supreme being, its relation to the human soul, and the process of creation (see INDIA—*Religion*). The word (which is Sanskrit) is made up of *upa,* 'beneath,' or 'near,' and *ni,* 'in,' combined with the radical *sad,* 'sit,' and is explained by the great theologian *S'ankara* (q.v.), and others, as meaning the 'science of Brahman,' or 'the understanding of the identity of Brahman and the soul,' because 'in those devoted to it this science *sets to rest* (or destroys) the world, together with (ignorance) its cause;' or, in other words, because it shows to them that the world has, besides Brahman, no reality. Its etymology has had various explanations, among which that by the grammarian Pân'ini seems most probable—that its earliest sense was that of 'secret' or 'mystery' (literally, 'that which *sits* or rests *beneath*'). In this view these works derived their name from their mysterious doctrine and their mystical style.

The Upanishads are considered to have for their object

the more clear discussion of the questions whose treatment had been begun in the Brâhman'a portion of the old Vedic hymns—questions as to the origin of the world and the true nature of the gods: see INDIA—*Religion*. Their object, like that of the Aran'yakas—whose obscure meaning they seek to make more clear—is to impress the mind with the belief in one supreme spirit (*Brahman*, as a neuter, and different, therefore, from the same word as a masculine, which is the name of the first god of the *Trimûrti*, q.v.); to show that this supreme spirit is the creator of the world; that the world has no reality if thought of besides Brahman; and that the human soul is identical in nature with that same spirit whence it emanates. The reward the Upanishads hold out to the believer in their doctrine is freedom from Transmigration (q.v.), and consequent eternal bliss. Thus the older Upanishads are the forerunners of the philosophical systems—whose aim also is theirs (see SANSKRIT LITERATURE). Ranging over different periods of Hindu religion, they differ from one another in manner and detail. Thus, in some, probably the earliest, legend and ritual blend with theosophical speculation; others are more philosophical; in others, the process of creation is treated in some harmony with the Vedânta (q.v.) or the Sânkhya (q.v.) philosophy; some emphasize the knowledge of Brahman as the only way to eternal bliss; while others, on the contrary, in conformity with the Yoga (q.v.) doctrine, assign a prominent place to the exterior means for union with the supreme spirit. The sectarian Upanishads, which identify this spirit with Vishn'u and S'iva, besides tending to reconcile the popular with the philosophical creed, have probably no claim to rank among Vedic writings.

Of the older Upanishads, a typical instance is furnished in the Chhândogya Upanishad of the Sâmaveda, the framework of which is legendary throughout, and its contents allegorical and mystical. In one of them, an allegorical passage remarkably coincides with the allegory in Plato's *Phædrus*. The *Talavakâra* or *Kena* Upanishad—one of the shortest and most philosophical—sets forth more clearly perhaps than any other, the doctrine that the true knowledge of the supreme spirit consists in the consciousness which man acquires of his *incapacity* to understand it, since the human mind cannot have a knowledge of what is infinite.

The Upanishads, though not supposed to have been revealed in the same manner as the Vedic hymns (see VEDA), are not assigned to human authorship, but deemed inspired writings (see S'RUTI). Some of them declare themselves direct revelations from the self-existent Brahma. As in the case of most ancient Sanskrit works, their date is utterly conjectural.—See Max Müller's *History of Ancient Sanskrit Literature* (Lond. 1860); John Muir's *Original Sanskrit Texts*, I.–IV. (Lond. 1858–63); ed. and transl. of several Upanishads by E. Roer, *Râjendra Lâla Mitra*, and E. B. Cowell, in *Bibliotheca Indica;* also Rajah Rammohun Roy's *Translation of several Principal Books*,

Passages, and Texts of the Veds (Lond. 1832). The names of 149 Upanishads were compiled by M. Müller: see his translation of the Upanishads.

UPAPURÂNA. See PURAN'A.

UPAS, n. *ū'pas* [Javanese]: poison: specifically, a poison consisting of the milky juice of the *Antiaris toxicaria*, or Upas-tree (q.v.), used by the Malays to poison their arrows, mixed with black pepper and the juice of the galanga-root and ginger; also, the tree from which this poison is derived. The prepared upas or antjar poison is kept in closed tubes of bamboo, and is of the consistence of molasses. The flesh of animals killed by this poison may be eaten with safety; though the virulence of the poison is shown by its extremely rapid action. It is not known what the substance is which gives to the juice of the upas tree its poisonous properties, but it appears to be an alkaloid.—A still more powerful poison than the upas antjar is the *Upas Tjettek*, or *Upas Tieute*, prepared from the root of the *Strychnos Tieute* (see STRYCHNOS): it abounds in strychnine.

U'PAS-TREE: a Javanese tree (*Antiaris toxicaria*), celebrated for its poisonous qualities, which, however, have been very much exaggerated. It was long believed in Europe that this tree was a solitary one situated in a valley in Java, that the pestilential qualities of it were so great that neither herb nor animal could live within many miles of it, and that criminals alone were sent to gather poison from it, few of whom ever returned. The Javanese themselves dread this tree, and will not rest beneath it, or even pass to leeward of it. The upas-tree belongs to the *Urticaceæ*, and the stem rises for about 60 feet before the first branch puts out. The wood itself is harmless, being used for furniture, but the bark, which is whitish, and nearly an inch thick, when wounded, exudes a viscid, milky yellowish sap, which becomes brown upon exposure and hardening into gum. From this sap, when mixed with the seeds of capsicum and other substances, a deadly arrow-poison is made, which is at first purgative and emetic in its effects, and then narcotic, finally killing the victim by tetanic convulsions. It is called upas-antjar. When the tree is felled or the bark is much injured, the tree gives out noxious exhalations which will cause cutaneous eruptions, and if the upas-tree be burned the smoke from it will produce the same result. A variety of the *Antiaris* is the sack tree, formerly known as *A. innoxia*. It has a bark, pieces of which, when soaked and beaten, can be turned inside out without without tearing, and, a section of the wood having been left for a bottom, can be used as a sack. It is said that a kind of coarse cloth is made from the fibrous inner bark of the upas-tree, and is worn by poor people, but that if wetted it excites an intolerable itching of the wearer's skin.

UPBEAR, v. *ŭp-bär′:* to bear up; to raise aloft; to elevate; to support; to sustain aloft.

UPBLOW, v. *ŭp-blō′:* to blow up or puff out; to make tumid.

UPBRAID, v. *ŭp-brād′* [from *up,* and the root of *bray,* to bawl, yell: Prov. *braidir, braidar,* to cry: Port. *bradar,* to cry out, to yell]: to charge with something wrong or disgraceful; to reprove with severity; to chide; to reproach; to cast in the teeth: N. in *OE.,* reproach; reproof. UPBRAID′ING, imp.: N. the act of reproaching in severe terms; reproaches or accusations made against any one to his face. UPBRAID′ED, pp. UPBRAID′INGLY, ad. *-lĭ.* —SYN. of 'upbraid, v.': to censure; condemn; reproach; blame; reprove.

UPBRINGING, n. *ŭp-brĭng′ĭng:* rearing; training; education.

UPCAST, a. *ŭp′kăst:* cast up; thrown upward; directed upward, as the eyes: N. in *bowling,* a throw. UPCAST, or UPCAST-SHAFT, in *mining,* the shaft for carrying off foul or heated air.

UPCOILED, a. *ŭp-koyld′:* made into a coil.

UPDRAW, v. *ŭp-draw′:* to draw up.

UPGATHER, v. *ŭp-găth′ėr:* to draw together close; to contract.

UPGAZE, v. *ŭp-gāz′:* to look upward.

UPGROW, v. *ŭp-grō′:* to grow up or over. UP′GROWTH, n. *ŭp′grōth,* increase; growth; advancement.

UPHAM, *ŭp′am,* CHARLES WENTWORTH: author: 1802, May 4—1875, June 14; b. St. John, N. B. He was for a while apprentice to an apothecary in St. John, then went to Boston, entered Harvard, there graduated, and, after studying theology in the Divinity School, was pastor of the First Chh. (Unit.) at Salem, Mass., 1824-44, retiring then on account of a bronchial affection. He was mayor of Salem 1852; member of the Massachusetts legislature 1840, 1849, and 1859-60. He served in the Massachusetts constitutional convention 1853, and in congress 1853-55. He was editor of the *Christian Register* 1845-6, and contributed to magazines and reviews. He was author of *Letters on the Logos; Lectures on Witchcraft; Life of Sir Henry Vane; Prophecy; Memoir of Francis Peabody;* and of the last 3 vols. of the *Life of Timothy Pickering.*

UP′HAM, THOMAS COGSWELL, D.D., LL.D.: metaphysician: 1799, Jan. 30—1872, Apr. 2; b. Deerfield, N. H. He graduated at Dartmouth 1818, and at Andover Theological Sem. 1821; was assistant professor of Hebrew at Dartmouth 1821-2; pastor of a Congregational church in Rochester, N. H., 1823; professor of mental and moral philosophy at Bowdoin 1824-67. He was author of many works on philosophy and on religious devotional life and experience; and translated several works of a similar

character, as Jahn's *Biblical Archæology; Life*, etc., *of Mme. Guyon.* Among his own writings are: *Elements of Intellectual Philosophy; Treatise on the Will; Imperfect and Disordered Mental Action; Life of Faith; Treatise on Divine Union; Method of Prayer; Christ in the Soul.*

UPHEAVE, v. *ŭp-hēv':* to lift up from beneath; to rise or swell upward. UPHEAV'ING, imp. UPHEAVED', pp.: ADJ. lifted or forced up from below by some elevating power. UPHEAVAL, n. a lifting up from below; in *geol.*, a lifting up of strata by some expansive or elevating power from below; a change in stratified rocks from an original horizontal position to one more or less inclined, produced by an expansive subterranean force, or other power, like the pushing forward of the crust itself, as in the case of the Appalachian Mountains (q.v.). In slight changes of level the continuity of the rock is unbroken; but frequently immense cracks are formed, into which igneous rocks penetrate, and form a backbone for the upraised mass, or dikes penetrating the strata. Upheavals may take place slowly, like the present gradual change in the Scandinavian coast, or may be more rapid when produced by some sudden earthquake. Sometimes the folding of the crust is such that rocks of an earlier age are superimposed on others of a later. See SYNCLINORIUM.

UPHELD, *ŭp-hĕld':* pt. and pp. of UPHOLD (q.v.).

UPHILL, a. *ŭp'hĭl:* steep, as a road; difficult or tedious, like the act of ascending a hill.

UPHOARD, v. *ŭp-hōrd':* to hoard up; to store away in a secret place; to store up; to treasure.

UPHOLD, v. *ŭp-hōld':* to lift on high; to elevate; to support or keep from falling; to maintain; to support; to sustain; to continue; to continue without failing; to keep from being lost. UPHOLD'ING, imp. UPHELD', pt. and pp. sustained; kept from falling. UPHOLD'ER, n. one who upholds; a defender; in *OE.*, an undertaker; an upholsterer.

UPHOLSTERER, n. *ŭp-hōl'stėr-ėr* [a corruption of *upholster* or *upholder*, the original meaning being, one who furbishes up old goods]: one who furnishes houses with beds, curtains, and the like; one who covers and cushions sofas, chairs, etc. UPHOL'STERY, n. *-ĭ*, the trade of an upholsterer; that kind of house-furnishings supplied by an upholsterer; upholsterer's work. UPHOL'STER, v. *-stėr*, to supply with house-furnishings; to provide with cushions, springs, coverings, etc., as to *upholster* chairs, sofas, etc. UPHOL'STERED, a. *-stėrd*, fitted with hangings and coverings of cloth, etc.

UP'JOHN, RICHARD: American architect: b. Shaftesbury, England, 1802, Jan. 22; d. Garrisons, N. Y., 1878, Aug. 16. He emigrated to the United States in 1829 and took up his residence in New Bedford, Mass. On being appointed to direct the alterations in Trinity Church, New York, he left Boston, where he had been engaged on

the designs for the court house of that city, and settled in New York, where he drew the plans for the Trinity Church of today, completed in 1846 and then considered the handsomest church in the United States. He also built the Church of the Ascension, the Church of the Holy Communion, Trinity Chapel, St. Thomas' Church, and others, in New York; St. Paul's Church, Buffalo, and the Church of the Pilgrims and Grace Church in Brooklyn. His civic architecture was chiefly that of Italian Renaissance, while his domestic buildings were of various styles.

UPJOHN, RICHARD MITCHELL: American architect, son of the preceding: b. Shaftesbury, England, 1828, March 7; d. Brooklyn, N. Y., 1903. He came to this country from England with his parents in his infancy and became a partner with his father when 20 years old. Among the many buildings erected with his coöperation are the Madison Square Church, the old Mechanics' Bank in Wall street; St. Peter's Church, Albany; the Central Congregational Church, Boston; Park Church, Hartford, Conn.; St. Paul's Protestant Episcopal Church, Brooklyn, and Trinity Parish School, New York. His chief work was the state capitol in Hartford, Conn., and he had frequently been employed as an expert on civic, state, and national commissions. He was a member of the American Institute of Architects from its foundation and was president of the New York chapter for two years. He was also a member of the Architectural League, an officer of the architectural department of the Brooklyn Institute of Arts and Sciences, and a life member of the Metropolitan Museum of Art. As an architect he was possessed of rare versatility. While he exhibited in his state capitol at Hartford a knowledge of what is meant by architectural magnificence, in other moods he produced ecclesiastical, collegiate, and domestic structures of a sober dignity and austerity of design which are not unworthy of the best ages of architecture.

UPLAND PLOVER: a sportsman's name for the Bartramian sandpiper. See SANDPIPERS.

UPLANDS, n. *ŭp'lăndz* [*up, high,* and *lands*]: ground elevated at intervals above the meadows and flats which lie on the banks of rivers, near the sea, or between hills; high ground. UP'LAND, a. pertaining to uplands; higher in situation. UP'LANDER, a. *-ẽr,* one who resides on the uplands. UP'LANDISH, a. *-ĭsh,* in *OE.,* dwelling on the higher grounds or on mountains; rustic; clownish.

UPLEAD, v. *ŭp-lēd':* to lead upward. UPLED', pp. in *OE.,* led upward.

UPLIFT, v. *ŭp-lĭft':* to raise; to elevate; in *Scot.,* to take up before due, as wages: N. a heaving or lifting up. UPLIFT'ING, imp. UPLIFT'ED, pp.: ADJ. raised high; elevated.

UPLOCK, v. *ŭp-lŏk':* in *OE.,* to lock up.

UPMOST, a. *ŭp'mōst* [*up, high,* and *most*]: highest; topmost. UPPERMOST is now generally used for UPMOST.

UPOLU, *ô-pō-lô' :* largest but one of the Samoan group of islands in the Pacific (see SAMOA); about 60 m. w. of Tutuila (q.v.), the third island in size; 550 sq.m. Upolu is mountainous, but well wooded and fertile, and has several rivers. The chief harbor is Apia (q.v.), a civilized looking place, with many edifices on the European model. Many of the natives are giving attention to cultivation of cotton, and the cotton-seed grows wherever it is cast on the ground. Coffee also is cultivated. The principal article of export is cocoa-nut oil. Upolu affords a plentiful supply of fruits and vegetables, and is visited annually by Brit. and Amer. whalers. The island became a possession of Germany in 1899. Many of the native inhabitants are Christians.—Pop. (1900) 18,341.

UPON, prep., sometimes used as an ad., *ŭp-ŏn'* [AS. *uppon, uppan,* upon—from *up, upp,* up; *on, an,* on]: resting on the top or surface of; not under: *upon* is in most uses strictly synonymous with *on,* whether denoting situation, as, *upon* the table; assumption, as, he took an office *upon* him; time when, as, *upon* the third day; basis or security, as, to lend money *upon* land; subsistence, as, to come *upon* the parish; engagement, as to start *upon* an enterprise, etc.

UPPER, a. *ŭp'pėr* [comparative of *up*]: higher in place, rank or dignity. UP'PERS, n. plu. the upper leather of a boot or shoe. UP'PERMOST, a. superl. *-mōst,* highest in place, rank, or power; predominant; most powerful. UPPER-HAND, n. superiority; advantage. UPPER HOUSE, the higher of two houses, in bicameral legislation; in Great Britain, the house of peers. UPPER SERVANT, one of the higher servants where many are kept. THE UPPER STORY, the head. UPPER TEN THOUSAND, UPPER TEN, the highest classes of the community; the aristocracy. UPPER WORKS, in a *ship,* the parts above water when the ship is fully freighted for a voyage. UP'PISH, a. *familiarly,* proud; stuck-up. UP'PISHPESS, n. empty pride; arrogance.

UPPER ALTON: Ill., city Madison co.; on the Chicago-B. & Q. and the Chicago & A. railroads; 2 m. n.w. of Alton. It is in an agricultural region. There are roof-tile works, a machine ship, grist mill, and other manufactories connected with the shipping of farm products. The educational institutions are the Shurtleff College (Baptist), opened 1827 and chartered in 1835; a high school, opened in 1885, and public elementary schools. Pop. 2,600.

UPPER CANADA. See ONTARIO.

UPPER HELDERBERG GROUP: a discarded term in geologic chronology, applied to the lower members of the Mid Devonic formations—the Schoharie Grit, and the Onondaga or coniferous limestone. The term was derived

from the Helderberg Mountains, where these rocks form the highest limestone members, while other limestones termed the Lower Helderberg group formed the basal limestone strata. To these latter, now classed as Lower Devonic, with the exception of the Manlius limestone, the name Helderbergian is now restricted. See DEVONIAN; OLD RED SANDSTONE.

UPPER IOWA UNIVERSITY: located at Fayette, Iowa. It was established as Fayette Seminary in 1857, and the name was changed to Upper Iowa University in 1858. It is supported and controlled by the Upper Iowa Conference of the Methodist Episcopal Church. It has been open to men and women on equal terms from the first, and a third of the graduates have been women. The organization includes the college of liberal arts, the academy, the normal school, the conservatory of music, a school of art, the school of oratory, the business college, the school of physical culture, and the summer school. The campus consists of 12 acres; the buildings include the Main building, South hall (women's dormitory), North hall, Chapel, Gymnasium, Observatory, and the David B. Henderson library, built by Andrew Carnegie. In 1908 the library contained over 14,000 volumes; the students numbered 504.

UPPER SANDUS'KY: Ohio, village, countyseat of Wyandot co.; on the Sandusky river, and on the Pennsylvania and the Columbus, H. V. & T. railroads, about 60 m. n. by w. of Columbus and 57 m. s. by e. of Toledo. It is in an agricultural and stock-raising region. The chief manufacturing establishments are machine shops, wagon and carriage works, foundries, flour mills, and furniture works. The educational institutions are a high school, established in 1872, public and parish schools, and a public library. The two banks have a capital of $155,000, and deposits amounting to $512,000. Pop. (1900) 3,355; (1910) 3,779.

UPRAISE, v. *ŭp-rāz':* to exalt; to raise up.

UPRIGHT, a. *ŭp'rīt* [*up,* high, and *right*]: erect; possessing rectitude; honest: N. something standing erect and perpendicular; a timber supporting a rafter or beam. UPRIGHT'LY, ad. in an upright manner; perpendicularly; honestly. UPRIGHT'NESS, n. state of possessing honesty and integrity. UPRIGHT'EOUSLY, ad. in *OE.,* uprightly.

UPRISE, v. *ŭp-rīz':* in *poetry,* to get up from a recumbent position; to rise from below the horizon; to rise, as a hilly ascent; N. in *OE.,* appearance above the horizon. UPRISING, n. *ŭp-rī'zĭng,* the act of rising from below the horizon, as the sun; the act of rising from a recumbent or sitting posture, a rebellion.

UPROAR, n. *ŭp'rōr* [Dut. *oproer,* a tumult, a sedition —from *up,* up; *roeren,* to stir: Dan. *röre;* Ger. *rühren;* AS. *hreran;* Icel. *hræra,* to move, to agitate: Ger. *aufruhr,* disturbance]: a violent disturbance and noise;

bustle and clamor: V. in *OE.*, to disturb by tumult or violence. UP-ROAR'IOUS, a. *-ĭ-ŭs*, accompanied with great noise and disturbance. UPROAR'IOUSLY, ad. UPROAR'-IOUSNESS, n. *-nĕs*, tumultuousness.

UPROLL, v. *ŭp-rōl':* to roll up.

UPROOT, v. *ŭp-rôt'* [*up*, high, and *root*]: to tear up by the roots; to destroy utterly; eradicate. UPROOT'ED, pp.

UPROUSE, v. *ŭp-rowz':* to awake from sleep; to excite to action.

UPRUSH, v. *ŭp-rŭsh:* to rush or sweep upward.

UPSALA, *ôp-sâ'lâ:* Sweden, a town situated on the Fyris river near the head of a navigable branch of Lake Mälar, 35 m. n.w. of Stockholm. The most prominent building is the Gothic cathedral built in 1260-1435, and restored in 1886-93. It contains the tombs of several Swedish kings. The main building of the university is a fine Renaissance structure built in 1879-87. The university was founded in 1477. It has about 1,400 students, a library of 300,000 volumes and 12,500 manuscripts, large collections of coins and paintings, a botanical garden and museum, with a statue of Linnæus, and observatory, and other scientific institutions. The industries are unimportant, but there is a large annual fair. Pop. (1901) 23,802.

UP-SAR-O'CA, or ABSARO'KA (Indians). See CROWS.

UPSET, v. *ŭp-sĕt:* to overturn; to overset; to throw down from an erect position; to disturb; unsettle, as, the news *upset* me; in *OE.*, to set or place up. UP'SET, n. an overturn; the act of disturbing or unsettling: ADJ. settled: fixed. UPSET PRICE, the price stated beforehand as the starting price below which bids will not be received when a house, estate, ship, or the like is put up for sale by auction—the sum from which increased offers may begin.

UPSHOT, n. *ŭp'shŏt:* conclusion; end; final issue; outcome; result.

UPSHUR, *ŭp'shėr*, ABEL PARKER: American statesman: b. Northampton co., Va., 1790, June 17; d. Potomac river, near Washington, D. C., 1844, Feb. 28. He was admitted to the bar in 1810, practised law at Richmond, Va., in 1810-24, and in 1825 served in the Virginia legislature. He was appointed judge of the general court in 1826, was a member of the convention to revise the state constitution in 1829, and then resumed his office as judge, serving until 1841, when he accepted the appointment as secretary of the navy under President Tyler. On the resignation of Daniel Webster in 1843 he became secretary of state, in which capacity he favored the pro-slavery party and also supported President Tyler's policy of annexing Texas. In 1844, Feb. 28, in company with the president and his party, he visited the war steamer Princeton on the Potomac river to witness the testing

of a large gun. It exploded in the experiments and Secretary Upshur, together with several others of the party, was killed.

UPSHUR, John Henry: American naval officer: b. Northampton co., Va., 1823, Dec. 5. He was educated at William and Mary College, entered the navy in 1841, served in the Mexican war, and participated in the capture of Vera Cruz. He was graduated from the Naval Academy at Annapolis, Md., in 1848, accompanied the Perry expedition to Japan in 1854, and in 1857-9 was flag-lieutenant on the African squadron. He was an instructor at the Naval Academy at the beginning of the civil war and was assigned to the South Atlantic squadron, with which he remained until 1862. He was then transferred to the North Atlantic squadron, was present at the engagements of Forts Royal and Hatteras and participated in the capture of Fort Fisher in 1865. He received promotion to commander in 1866, captain in 1872, commodore in 1880, was in command of the New York navy yard in 1882-4, and in the latter year was made rear-admiral in command of the naval forces of the Pacific. He was retired in 1885 at his own request.

UPSIDE, n. *ŭp-sīd:* the upper side or part. Up'sides, ad. *-sīdz,* in *familiar language,* in the phrase 'I shall be *upsides* with him,' meaning I shall get even with him; I shall have my revenge. Upside-down, ad. *ŭp'sīd-down'* [OE. *up-so-down*]: with the upper part down; in complete disorder and confusion; upsodown; topsy-turvy.

UPSPRING, v.: in *OE.,* to spring up: N. in *OE.,* a man suddenly raised; an upstart.

UP-STAIRS: see under Stair.

UPSTART, n. *ŭp'stârt:* one who has suddenly risen from a humble station to wealth and power, and uses them arrogantly: V. to spring up suddenly: Adj. suddenly raised to wealth and power.

UPSTAY, v. *ŭp-stā':* in *OE.,* to sustain; to support.

UPSWARM, v. *ŭp-swawrm':* to rise in a swarm or swarms.

UPTAKE, v. *ŭp-tāk':* in *OE.,* to take into the hands: N. *ŭp'tāk,* in *Scot.,* power or capacity to learn; understanding; comprehension. In a vertical boiler, it is the internal flue which leads from the furnace to the chimney. In a marine boiler, it is the return flue.

UPTEAR, v. *ŭp-tär':* to tear up; to rend.

UPTHROW, n. *ŭp'thrō:* in *mining,* a sudden uplift of strata by a fault or dislocation; upheaval.

UPTON, *ŭp'ton,* Emory: soldier: 1839, Aug. 27—1881, Mar. 14; b. Batavia, N. Y. On graduating at West Point, 1861, he became 2d lieutenant of artillery, and the same year 1st lieutenant. He was wounded at the first Bull Run battle; commanded a battery in the Vir-

ginia Peninsular campaign and in the Maryland campaign 1862; in October became colonel of a New York volunteer regiment, and commanded a brigade in the 6th corps of the Potomac Army till the end of 1863. For conspicuous bravery he was promoted brigadier general of volunteers on the field 1864, May 12. He served in the siege of Petersburg and in the defense of Washington 1864; was severely wounded while commanding an infantry division in the Shenandoah campaign; and commanded a cavalry division during the closing operations in Georgia and Alabama. He was brevetted major general U. S. A. at the end of the war; became lieutenant colonel 25th infantry U. S. A. 1866; was commandant of cadets at West Point 1870-75; colonel 4th artillery 1880. He wrote volumes on *Tactics* and on *The Armies of Asia and Europe:* see his *Life and Letters,* by Peter S. Michie (1885).

UPTRAIN, v. *ŭp-trān′:* to train up; to educate.

UPTURN, v. *ŭp-tėrn′:* to turn up.

UPWARD, a. *ŭp′wėrd* [AS. *up;* up; *weard* or *weardes,* used in composition to express direction]: directed to a higher place; having an ascending direction: AD. toward a higher place; toward the head or source; also UP′WARDS, *-wėrdz,* opposed to *downwards.*

UPWHIRL, v. *ŭp-hwėrl′:* in *OE.,* to raise upward with quick rotation.

UPWIND, v. *ŭp-wīnd′:* to wind or roll up; to convolve. UPWOUND′, pp.

URACHUS, n. *ū′rā-kŭs* [Gr. *ourachos,* the urinary canal of a fetus—from *ouron,* urine]: a cord composed mainly of fibrous tissue, but containing some smooth muscle and sometimes the remains of an epithelial-lined cavity, attached to the summit of the bladder and ascending to the umbilicus. It represents part of the allantois, a sac of the embryo, from which the bladder develops as a dilation of the internal portion, while the original cavity disappears.

URÆMIA, n. *ū-rē′mĭ-ă* [Gr. *ouron,* urine; *haima,* blood]: a form of blood-poisoning caused by the retention of certain waste products which are excreted by the kidneys when these organs are healthy. The symptoms are chiefly referable to the nervous system—headache, vertigo, convulsions, coma, and sometimes more or less pronounced paralysis. The sight may be impaired and sometimes complete blindness in one or both eyes occurs. Shortness of breath is common, and sometimes there is a peculiar irregularity in the respiratory movement. Nausea, vomiting and other gastro-intestinal disturbances are frequently observed. Uræmic symptoms occurring in the subjects of Bright's disease are an indication that the disorder is progressing, the kidneys being unable to excrete the waste products of the body as rapidly as they are formed.

URÆ'MIC, a. *-mĭk*, of or pert. to uræmia.

URAGA, *ô-râ'gâ:* Japan, a seaport town of Hondo, in the Sagami province, 16 m. s.e. of Yokohama. Perry Park opened in 1900 at Kurihama, a suburb, commemorates the advent of Commodore Perry's fleet at Uraga in 1853, and the negotiations which led to the opening up of Japan again to foreign commercial and political relations. Pop. 13,000.

URAL, *ū'ral* or *ô-râl'* (formerly JAIK or YAIK, the *Rimna* of the ancients): name since 1775 of a river of Russia, rising in the southern section of the Ural Mts., near the east frontier of the govt. of Orenburg, and flowing south through the district of Troizk, past the town of Virchni-Uralsk, to its confluence with the Kisil; in this region its current is very rapid, due to its narrow and uneven bed. At the town of Orsk the Ural bends and runs west as far as the mouth of the river Tchagan; after which it flows directly south into the Caspian Sea. It is in parts deep enough for navigation; but the scarcity of wood for ship-building, and the number of sand-banks that bar the river, prevent navigation. It abounds in highly esteemed varieties of fish, and yields to the Cossacks settled along its banks an annual revenue of 600,000 roubles (about $450,000). The Ural has long served as the boundary between Russia and the Kirghis Steppes, and many forts have been erected, and settlements of Cossacks—known as the Ural Cossacks—established along the river. The direct length of the Ural is estimated at 550 m.; with its windings, 1,040 m. The principal affluents are the Kisil and Sakmara on the right, and the Or and Ilek on the left.

URAL-ALTAIC. See TURANIAN.

URALITE, n. *ū'ră-līt* [from the *Ural* Mountains, where first found]: a pseudomorphous mineral of a dark-green or greenish-black color.

U'RAL MOUNTAINS (the *Hyperborean Mountains*, or *Rhipæi Montes*, of the ancients): chain of mountains, forming the boundary between Europe and Asia, separating European Russia on the w. from Siberia on the e. The Ural Mountains extend s. from the Kara Sea, arm of the Arctic Ocean, to the middle course of the Ural river—i.e., lat. 70°—50° n.; 1,333 m. in length, with breadth varying from 16 to 66 m. Though the Ural Mountains form a single uninterupted chain, they are usually divided by geographers into the North, Middle, and South Ural. The North Ural separates the basins of the rivers Petchora, and Ob, is mostly rocky, seldom rises higher than 3,600 ft., and is commonly called *Poustoi* (empty), because it is extremely poor in mineral wealth. The Middle Ural, commonly called *Roudnoi* (metalliferous), principal seat of the mineral riches of the chain, comprises the highest peaks, as the Kanjakovski Kamen, 5,000 ft.; but in some places the height is

so insignificant, and the slope so gentle, that travellers can scarcely distinguish it from the lowlands. The Southern Ural divides into 3 branches, 2 of which extend east of the Ural river, and gradually disappear in the Uralo-Caspian deserts; while the third branch extends along the west bank of the Ural. The chain is composed chiefly of crystalline and metamorphic rocks, granite, gneiss, porphyry, chloritic, and micaceous schists. The Ural Mountains, especially the middle and the north of the South Ural (the governments of Perm and Orenburg), abound in mines of gold, platinum, copper, and iron. These mines, or *zavods,* belong partly to the state and partly to individuals. Of the latter, the chief are the Nijni-Tagilsk, belonging to the Demidoff family (a grant from Peter the Great); the Verchisetsk and Neviansk, belonging to the Takosleff family. The gold diggings are on both slopes of the mountains: sometimes nuggets of considerable weight are found—the heaviest ever found in the chain being about 80 lbs. During about half a century the annual value of the product of the Ural mines has increased from 50 millions of roubles to about 80 millions. More than four-fifths of the iron of Russia is got from the Ural districts. The magnetic ironstone of the Urals is admirably suited for making steel and wire, and is largely exported for this purpose. Several thousand tons of copper are raised annually, besides immense quantities of rock-salt. Among precious stones, most notable is the emerald, found on the east slope in the dist. of Ekaterinburg; some of these have weighed more than 13 dwts. Other precious stones are the beryl, topaz, amethyst, and perhaps the diamond, for, though found in a certain locality, as predicted by Humboldt, it is now generally believed that the locality was 'salted.' Malachite and jasper also occur.

URANIA, *ū-rā′nĭ-a:* the 'heavenly one,' sometimes a title of Aphrodite, as the goddess of noble love, but more commonly the name of the muse of astronomy, a daughter of Zeus and Mnemosyne. She is generally represented with a crown of stars, in a garment spotted with stars, and holding in her left hand a celestial globe or a lyre. By Apollo she was mother of Hymenæus and Linus. See MUSES.

URANI′IDÆ: a family of moths. See MOTH.

URANINITE, URANIN, or PITCHBLENDE: a dark-green to black mineral belonging to the isometric or cubical system. Usually occurs in a massive condition. Brittle, hardness, 5.5; specific gravity, 6.4 to 9.7; lustre, submetallic and greasy or pitch-like; streak, brownish-black to dark olive green; fracture, conchoidal; composition: an oxide of uranium that may be considered a uranate of uranyl. It also contains some lead and very small amounts of other elements, among which are radium (q.v.) and the rare gaseous element helium. Pitchblende is the

chief commercial source of uranium and radium. It is mined in considerable quantity at Joachimsthal in Bohemia. Found also in many other places as Cornwall, Saxony, Hungary, Turkey and in the United States in Connecticut, North Carolina, etc.

URA'NIUM: a metallic chemical element, symbol U, atomic weight 238.5, specific gravity 18.6. It was discovered by Klaproth (1789) in the mineral pitchblende and named by him in honor of Herschel's discovery of the planet Uranus. The body discovered by Klaproth was really the oxide of uranium, the free metal being first isolated by Peligot (1842). It is one of the rarer elements and occurs in nature only in combination with other elements. The principal minerals containing it in any considerable quantity are *uraninite* or pitchblende (75 to 85 per cent U_2O_3), a greenish mineral coming chiefly from Joachimsthal in Bohemia, though found in other places; *gummite,* a hydrated calcium lead uranium silicate; *uranosphærite,* a hydrated bismuth uranite; *torbernite,* a hydrated copper uranium phosphate from Saxony and Cornwall; and *autunite,* a hydrated calcium uranium phosphate from the same regions. The metal is prepared by heating a mixture of uranium chloride, sodium chloride, and carbon or of uranium chloride, sodium chloride and metallic sodium. It is a malleable white metal looking like nickel. It oxidizes very slowly in the air at ordinary temperatures, but rapidly burns to U_3O_8 when heated above 400° F. Is soluble in mineral acids. It acts both as an acid and a basic element. We have *uranous* salts such as UCl_4, *uranyl* salts in which the group UO_2 acts as a basic radical, example uranyl chloride $(UO_2)\ Cl_2$ and *uranates* which are formed by the combination of the oxide UO_3 with strong bases. Sodium uranate, or uranium yellow, is used in glass and china painting and in the manufacture of beautiful fluorescent uranium glass. Metallic uranium and minerals containing its compounds possess marked radioactivity. See RADIUM.

URANOGRAPHY, n. *ū-râ-nŏg'ra-fĭ* [prefix *urano-;* Gr. *graphō,* I write, I describe]: description or chart of the heavens; that branch of astronomy comprising the determination of the relative situations of the heavenly bodies and the construction of celestial maps, globes, etc.

URANUS, *ū'ra-nŭs:* in Greek mythology, the son of Gæa, the earth, and by her the father of the Titans, Cyclopes, etc. He hated his children, and confined them in Tartarus, but on the instigation of Gæa, Kronos, the youngest of the Titans, overthrew and dethroned him.

URANUS: in astronomy, one of the primary planets, and the seventh from the sun, discovered by Sir William Herschel in 1781. To the naked eye it appears like a star of the sixth magnitude. Its mean distance from the sun is about 1,754 millions of miles, and the length of the year 30,686.82 days, or about 84 of our years. Its

mean diameter is estimated at about 33,000 miles. Its volume exceeds the earth's about 74 times, but as its mean destiny is only 0.17 (the earth's being 1) its mass is only about 12½ times more. The length of its day is supposed to be between 9 and 10 hours.

URAO, n. *ū-rā'ŏ:* a native name for the sesquicarbonate of soda, found in crystalline crusts in the dried-up lakes and river-courses of S. Amer., known to the Arabs of Africa, etc., by the name of *trona.*

URARI, n. *ū-râ'rĭ* or *ū'răr-ĭ.* See CURARE.

URATE. See under URIC.

URBAN, a. *ėr'ban* [L. *urbānus,* belonging to the city—form *urbs,* a city]: of or belonging to a city or town; resembling or characteristic of a city; dwelling in cities or towns; in *OE., courteous.* URBANE, a. *ėr-bān',* courteous; civil; polite; refined. URBANITY, n. *ėr-băn'ĭ-tĭ,* courtesy; politeness; civility; polished manners; suavity; affability.

URBAN, *ėr'ban,* II. (surnamed OTHO or ODO), Pope abt. 1042-99, July 29 (reigned 1088-99); b. at Lagery, near Chatillon-sur-Marne; of knightly rank. He was educated for the priesthood, and was archdeacon of Rheims, when he resigned, and became a monk at Clugny, of which he afterward became prior. In 1078 he was cardinal-bp. of Ostia, and was elected pope 1088, in a council at Terracina, during the schismatical pontificate of the anti-pope, Guibert, styled Clement III. Soon after his election, he resumed possession of Rome, whose fortresses had been occupied by the anti-pope, whom he compelled to withdraw. Guibert, however, was still supported by his patron, Henry IV. of Germany, who had long been at feud with the papal see; and Urban, with Countess Matilda, having formed a strong party in Italy, Henry once more led an army thither, restored the anti-pope, and forced Urban to flee. Urban established himself at Anagni. The revolt of Conrad, eldest son of Henry, against his father, and his coronation as emperor at Milan 1093, and still more successful appeal of Henry's queen, Adelaide, turned the tide of affairs in Italy. A great council was held at Piacenza 1095, in which the anti-pope and his adherents were excommunicated. In the same council the Crusade was proclaimed; and, in the following autumn, Urban, in a council held at Clermont, made the well-known appeal which called forth that enthusiasm which was destined to lead to the long series of efforts for recovery of the Holy Land, forming so striking a characteristic of mediæval history. In his later pontificate Urban pursued the same course, and in the end succeeded in driving Henry IV. out of Italy. The most important event of the last years of his pontificate was the council held at Bari 1098, in which many Greek bishops were present, and in which the addition of the words *Filioque* (q.v.) to the creed was discussed. Thence

he returned to Rome, of which he obtained full and undisturbed possession. He died 14 days after the fall of Jerusalem, but before the news reached him.

UR'BAN V. (originally named WILLIAM DE GRIMOARD). Pope: 1309-70, Dec. 19 (resigned 1362-70); b. Grisac, Languedoc, France. He was a Benedictine monk; became abbot of Auxerre 1353, and of St. Victor at Marseille 1358. On the death of Innocent VI. 1362, Oct. 28, Urban was elected pope at Avignon, where he continued to reside, sending his legate, Cardinal Gil de Albornoz, to reduce the rebellious subjects of the papal see in Rome. After various alternations of peace and contest, Urban resolved to return in person to the ancient seat of the papacy. He set out 1367, and, landing at Corneto, proceeded first to Viterbo, and reached Rome in October. He found the papal city in great disorder, and all Italy overrun by bands of mercenaries, and a prey to frightful intestine divisions. Failing in his endeavors to correct these disorders, he resolved 1370 to withdraw from Rome. He arrived at Avignon Sept. 24, where he died three months later, leaving a reputation of great personal piety, disinterestedness, and zeal for the interests of religion. He was succeeded by Gregory XI.

UR'BAN VI. (original name BARTOLOMMEO PRIGNANO), Pope: 1318-89, Oct. 15 (reigned 1378-89); b. Naples. At the time of his election to the papal see, 1378, Apr. 8, he was abp. of Bari. On the death of Gregory XI., who had finally returned to Rome, and had died in that city, Prignano was elected in a conclave held under circumstances of great excitement, owing to the apprehension, on the part of the populace, of an intention to elect a French pope, and again abandon Rome. The cardinals in the conclave numbered 16, of whom 12 were French and 4 Italians. Prignano, though not a cardinal, was elected unanimously, though the populace broke into the hall. Prignano assumed the title Urban VI., and was crowned Apr. 18, in the presence of the 16 cardinals. In July the 12 French cardinals assembled at Anagni, and revoked the election of Urban VI., declaring that in it they had acted under fear of violence. To this course they are said to have been led by the rigor and the intemperate severity with which Urban VI. was proceeding in reforms of discipline, especially as regarded the simony and the irregular life of the clergy, including the cardinals themselves. Joined by three of the Italian cardinals (one of them having died), they elected the cardinal-bp. of Cambray (born Count of Geneva) pope, under the name Clement VII., Sept. 20. Clement took up his residence at Avignon. Urban remained at Rome, where he appointed 26 new cardinals, and excommunicated Clement and his adherents. This conflict was the origin of the WESTERN SCHISM (q.v.). Urban was recognized as the lawful pope by one portion of the

West, Clement by the other; and each maintained his claim by extreme measures. Urban especially, though his title seems to have been best founded, weakened his cause by his excessive violence. Having engaged in a dispute with Charles, King of Naples, whom he himself had crowned, he was besieged by that prince at Novara, whence he withdrew to Genoa, taking with him, as prisoners, the cardinals of his party with whom he had quarrelled, several of whom he is said to have put to death. In 1389, while on his way to Ferentino, he fell from his horse, and having been conveyed to Rome, died there from the injuries thus sustained.

URBAN VIII. (originally named MAFFEO BARBERINI), Pope: 1568-1644, July 29 (reigned 1623-44); b. Florence. After a long series of brilliant service in the domestic administration and in foreign nunciatures, he was elected pope (succeeding Gregory XV.) 1623, Aug. 6. In the difficult position of Roman affairs he acquitted himself with much dexterity. His pontificate was signalized by the acquisition by the holy see of the duchy of Urbino (q.v.) 1626. Urban died in Rome. His memory has suffered through the imputation of nepotism; but his administration was, on the whole, vigorous and enlightened. He was the founder of the celebrated College of the Propaganda, and to him Rome is indebted for many public works, including large and important additions to the Vatican Library. Some of the early stages of the Jansenist controversy (see JANSEN) fall within this pontificate.

URBANA, *ėr-băn'a*: Ill., city, county-seat of Champaign co.; on the Illinois Central, the Wabash, the Cleveland, C., C. & St. L. railways; about 78 m. n.e. of Springfield, and 128 m. s. by w. of Chicago. It is in an agricultural region, and in the vicinity are valuable deposits of fire-clay. It was settled in 1824, incorporated 1833, May 6, and chartered as a city in 1860. The chief industrial establishments are the 'Big Four' railroad shops, with 700 employees; brick works, 300 employees; and lawn mower and machine works, 50 employees. The principal public buildings are the county court-house, municipal buildings, Y. M. C. A. building, the churches, and schools. The educational institutions are the State University (q.v.), the Thornburn high school, public elementary schools, and two libraries. The three banks have a combined capital of $500,000, and the average annual business amounts to $5,000,000. The government is administered under a charter granted by the legislature, which provides for a mayor and a council of 10 members, who are elected annually. Pop. (1910) 8,245.

URBANA: Ohio, city, county-seat of Champaign co.; on the Erie, the Pittsburg, C., C. & St. L., and the Cleveland, C., C. & St. L. railways; about 90 m. n. of Cincinnati and 45 m. w. of Columbus. It is in an agricultural region.

The chief industrial establishments are the U. S. Rolling Stock Company works, carriage and wagon factories, stove works, machine ships, agricultural-implement works, shoe factories, broom and furniture factories, woolen mills, straw-board works, water-wheel works, a tannery, and a flour mill. The principal public buildings are the county court-house, municipal buildings, churches, and schools. The educational institutions are Urbana University (Swedenborgian), founded in 1850, a high school (building cost $125,000), public and parish elementary schools, public library, and the library of the university. The three banks have a combined capital of $300,000 and deposits amounting to $992,030. Pop. (1910) 7,739.

URBI ET ORBI, *ėr'bī ĕt or'bī* [L. *literally*, to the city, i.e., Rome, and to the world]: the form used in the publication of papal bulls, to signify their formal promulgation to the entire Cath. world, as well as to the city of Rome. By canon law, promulgation is necessary to give any new law force. A controversy arose in the 17th c. as to the kind of promulgation which should be regarded as sufficient. In ancient times the practice of the popes had been to send copies of their bulls to the primates, metropolitans, and other ecclesiastical heads of the several churches, to be by them communicated to their suffragan bishops; but in course of time the practice of publicly proclaiming the decree by the voice of a crier (*præco*) from the piazza of the Campo di Fiore (*in acie campi Floræ*), or of affixing the document to the gates of the Vatican, was substituted, and decrees addressed URBI ET ORBI, and published in this way, were held to be sufficiently promulgated, and to be thenceforth of full force. French jurists of the 17th c. strenuously opposed this view.

URBINO, *ôr-bē'nō:* city of central Italy, capital of the provinces of Urbino and Pesaro; 20 m. s.w. of Pesaro, between the rivers Metauro and Foglia. Its walls date from the 14th century; it has a magnificent palace, formerly the residence of the Dukes of Urbino, where was the famous library of the Della Rovere family, afterward removed to the Vatican. Another handsome palace is that of the Albini, belonging to a Albinian family who had escaped from the ferocity of the Turks, and settled in Urbino, where they became rich and powerful, and gave a pope to the church, who took the name Clement XI. Urbino is an archiepiscopal see It is the birthplace of Raphael (q.v.) Urbino was a *municipium* or free town under the Romans, and during the middle ages became the seat of a race of independent dukes. In 1626, on the death of Francesco, the late duke, Pope Urban VIII. took possession of the duchy as a vacant fief; and it was part of the Papal States till it became part of the kingdom of Italy.—Pop. of commune 18,000.

URCEOLAR, a. *ėr'sĕ-ō-lėr* [L. *urcĕŏlus*, a little pitcher,

a water-pot, dim. of *urcĕus,* a pitcher]: in *bot.,* fleshy or bulging, as tubercles or leaves. UR'CEOLATE, a. *-lāt,* urn-shaped; shaped like a pitcher. UR'CEOLUS, n. *-lŭs,* in *bot.,* the two confluent bracts of the genus *Carex;* any anomalous organ shaped like a cup.

URCHIN, n. *ėr'chĭn* [OE. *urchone,* a hedgehog—from OF. *ireçon*—from L. *erĭcĭus;* Gr. *chēr,* a hedgehog, an urchin: F. *hérisson,* a hedgehog]: the hedgehog; a familiar name given to a child; a little child; in *OE.,* a goblin; imp. SEA-URCHIN, the echinus, a creature having a spherical shell flattened on the lower side and covered with prickly spines (see ECHINIDÆ).

URDU, n. *ôr'dô* [Hind. *urdu,* an army, a camp, a market]: the Hindustani language as spoken by the Mohammedan population of India. It is really the Hindi language, which is of the Aryan family, with a number of Persian, Arabic, and Turkish words introduced. It is now the language most largely used by Europeans in their intercourse with the natives of India.

URE, n. *ūr* [OF. *eure;* F. *œuvre,* work—from L. *opĕra,* work]: in *OE.,* practice; use.

URE, *yôr,* ANDREW, M.D.: Scottish chemist: 1778—1857, Jan. 2; b. Glasgow. He was educated at Glasgow Univ., but studied medicine at Edinburgh. Returning to Glasgow, he received the degree M.D. 1801. In 1802 he became professor of chemistry and natural philosophy in the Andersonian University (see ANDERSON, JOHN), was active in establishing (1809) an observatory at Glasgow, and was appointed its first astronomer. 1813 he published *Systematic Table of the Materia Medica;* 1818, *New Experimental Researches on Some of the Leading Doctrines of Caloric,* memoir read before the Royal Soc., and which brought Ure into notice. 1821 appeared his *Dictionary of Chemistry;* 1822, a paper *On the Ultimate Analysis of Animal and Vegetable Substances,* one of the earliest contributions to organic analysis, and a translation of Berthollet on *Dyeing;* and 1829, a *System of Geology,* in which the hypothesis of a general flood was maintained. 1830 Ure removed to London, and 1834 was appointed analytical chemist to the board of customs. From this time his works assume a technological character, e.g., *Dictionary of Arts, Manufactures, and Mines* (1839), 7th ed. brought out by Robert Hunt in 3 vols. (1875), sup. vol. 1878. Ure was a fellow of the Royal Society, and a member of the Geological, Astronomical, and other societies.

UREA, n. *ū-rē'ă* [Gr. *ouron,* urine]: the principal waste product in the urine of mammals, and it occurs in small amounts in that of birds, especially when they are fed on meat. In the urine of man it is present to the amount of 2.5 to 3.2 per cent, and also occurs in the blood in the proportion of 0.025 per cent, and may be obtained from the liver, the perspiration, and the lymph.

Under the influence of bacteria it undergoes alkaline fermentation, and carbonate of ammonia is formed. Urea is the final product of the decomposition of proteids in the body, the proteids of food, of the tissues, and of the blood and lymph. It is the form in which the nitrogen of the body is given off, and is believed to be formed in the liver out of leucin, tryosin, and other products, and to be separated by the kidneys from the blood when that fluid reaches them. When the liver is diseased there is likely to be a diminished amount of urea excreted. It is increased in proportion to the amount of nitrogenous food, such as meat, which is absorbed, and probably also by muscular exercise. In the conversion of proteids into urea the change is not immediate; there are formed intermediate substances—leucin, tryosin, creatin, etc.

'In disease, urea is retained in the system in all cases where there is decreased diuresis, disease of the kidneys, or diminished arterial pressure. Excessive perspiration, diarrhœa, and transudation of water into the serous cavities of the body, or into the connective tissue, by lessening the fluids excreted by the kidneys, also diminish the quantity of urea secreted. Urea is increased in acute febrile diseases until the acme of the fever is reached. It then later becomes subnormal, and during convalescence gradually approaches the normal.'

UREDO, *ū-rē'dō:* genus of minute parasitic fungi, order *Coniomycetes.* The original genus Uredo has been divided into many genera, forming a group *Uredineæ,* which contains a multitude of species, parasitic on phanerogamous plants of almost every nat. order and in all parts of the world. Different plants have their own peculiar parasites of this kind, or at least the same *Uredineæ* are confined to plants nearly allied. A few species occur on ferns. Every external part of plants, except the roots, is liable to be infested with these fungi; and some of them attack the inner tissues, their spores at length breaking through the outer strata of cells. Submerged parts of plants are never affected by them, for fungi dislike water; but the floating portions of aquatic plants are not exempt; and in all cases a moist atmosphere seems favorable to their development. Rank luxuriance of growth is often attended by their appearance. A plant once attacked is afterward subject, if perennial, to the same parasite, even if removed to another situation. There is reason to believe that the spores of the *Uredineæ* are taken up by the roots of plants from the soil, and find their way with the sap to the place proper for their growth. See Brand; Bunt; Mildew; Rust; Smut.

UREME'YAH. See Oroomiah.

URENA, *ū-rē'na:* genus of herbaceous plants, nat. order *Malvaceæ.* The bark is very fibrous. The fibre of *U. lobata* and *U. sinuata,* weeds common in most parts of India, is used as substitute for flax. It is strong and moderately fine.

URETER, n. *ū'rē-tėr* [Gr. *ourētēr*, the passage for the urine—from *ouron*, urine]: in *anat.*, the tube or duct that conveys the urine from the kidney to the base of the bladder. It is about 18 in. in length, and enters the bladder in a slanting direction to prevent regurgitation (see KIDNEYS).

When a concretion is formed in the kidney, the ordinary and most favorable event is that it should descend through the ureter to the bladder. The passage of a stone through this tube gives rise to a series of violent symptoms: the patient complains of sudden and severe pain, first in the loins and groin, subsequently in the testes (in the male). The testes are retracted spasmodically; and there are violent sickness, faintness, and collapse, which may last two or three days, being relieved only when the stone reaches the bladder. Treatment consists in the warm bath, and (under medical advice) inhalation of chloroform, or opium in large doses, to allay spasm and deaden pain, free use of diluents to wash down the concretion, and, if the sickness is very severe, an occasional tumbler of hot water containing half a teaspoonful of carbonate of soda. URETERITIS, n. *ū-rē'tėr-ī'tĭs*, inflammation of the ureter.

URETHRA, n. *ū-rē'thră* [Gr. *ourēthra*]: the canal by which the urine is conveyed from the bladder and discharged. In the female it is about an inch and a half in length, and its opening is concealed by the external parts. In the male it is from seven to nine inches in length and is divided anatomically into three portions, according to the parts through which it runs. It is, however, a continuous canal of nearly equal diameter throughout. The first, or prostatic, portion is a little over an inch in length and pierces the prostate gland at the neck of the bladder; its diameter is slightly greater than that of the rest of the canal. The membranous urethra, of about the same length as the prostatic portion, runs from the prostate gland to the spongy body or beginning of the male organ; it is the narrowest part of the canal. The spongy portion, five or six inches in length, traverses the penis and ends at the meatus or external opening. URE'THRAL, a. *-thrăl*, pertaining to the urethra. URETIC, n. or a. *ū-rĕt'ĭk*, a medicine which increases the secretory action of the kidneys; pertaining to such a remedy.

URFA, *ôr'fâ*, or OR'FA: modern name of EDESSA (q.v.).

URGA, *ôr'gâ* (called by the Mongols HURÆ and by the Chinese K'U-LUN): town of Mongolia, administrative centre of the n. and e. Khalkas; on the river Tola, in a valley, 4,100 ft. above sea-level; lat. 48° 20′ n., long. 107° 30′ e.; 350 m. s.e. of Irkutsk, 700 m. from Peking, 168 m. from Kiachta. It consists of two settlements 2 to 3 m. apart—one occupied by Mongols, pop. 10,000; the other by Chinese, pop. 5,000, mostly men—the law for-

bidding Chinese to bring their wives. The Chinese town, which is the trading quarter, has many substantially built houses and a generally thrifty appearance. In a suburb of the Mongol town is a Lamaist monastery, the seat of a 'resplendently divine Lama,' ranking as the third dignitary in the Lamaist Church, and metropolitan of the Khalkas: see LAMA. The convent covers a large area and includes the dwellings of the priests. Each family educates one of its children for the Lamaist priesthood. There is a Chinese gov., appointed at Peking.—Total pop. (as above) 15,000.

URGE, v. *ėrj* [L. *urgērĕ,* to press upon, to drive]: to push; to impel; to incite; to press, as an argument or objection; to importune; to press forward; to constrain; in *OE.,* to provoke; to exasperate. URGING, imp. *ėrj'ĭng:* ADJ. pressing with solicitations; importunate. URGED, pp. *ėrjd.* URGENT, a. *ėrj'ĕnt,* pressing; importunate; forcible; cogent. URG'ENTLY, ad. *-lĭ.* URG'ENCY, n. *-ĕn-si,* pressure of difficulty or necessity; entreaty; importunity. —SYN. of 'urge': to animate; instigate; stimulate; encourage; enforce; solicit.

URI, *ô'rē:* one of the Waldstädten or Forest Cantons of Switzerland; part of the Hill Country (see SWITZERLAND) which surrounds the Lake of Lucerne; bounded w. by the cantons of Unterwalden, Bern, and Valais; 415 sq.m. It consists of one valley, that of the Reuss, about 30 m. long, inclosed on all sides by lofty mountain chains, which include the s.e. bay or reach of the lake into which the river falls. A great high-road through the valley ends on the s. at the St. Gothard Pass, connecting the Uri with Ticino, and forming part of one of the great routes into Italy. Uri is almost entirely pastoral. Goats are very numerous. In the low grounds, there are a few fields of corn and potatoes, and gardens and orchards, but even this cultivation is limited. The people speak a Swiss-German dialect and are Roman Catholics. Uri is a democracy. The landesgemeinde, held in a meadow once a year, is formed of the whole male population who have reached 20 years of age.: the highest power resides in this assembly. The preconsideration and superintendence of the law belongs to the *landrath,* of 7 members chosen by the landesgemeinde and 61 by the several communes. A governing council of 11 members, with the landamman as president, discharges executive functions. Civil justice is administered in the highest instance by a cantonal court of 11 members. A tribunal of 7 members decides in criminal causes. Altorf is the cap., with pop. 3,000. A fountain surrounded by stone statues of Tell and his son marks, according to the doubtful tradition, the spot where Tell took his aim, and another that where the boy stood with the apple on his head.—Pop. (1900) 19,700.

URIC, a. *ū'rĭk* [Gr. *ouron,* urine (see URINE)]: of or

from urine. U'RATE, n. *-rāt*, a salt of uric acid; the common deposits in the urine known as sand or gravel.

U'RIC (formerly LITHIC) ACID ($C_5H_4N_4O_3$): substance named from its being a constituent of urine and of urinary calculi respectively. In a state of purity it occurs in the form of loose white powder or scales consisting of minute crystals, devoid of smell or taste, only very slightly soluble in water (1 part requiring about 15,000 parts of cold and 1,800 of boiling water), and quite insoluble in alcohol and ether. This acid is, however, soluble without decomposition in strong sulphuric acid, and it may be thrown down from this solution by addition of water. It is soluble also in the carbonates, borates, phosphates, lactates, and acetates of the alkalis, extracting from these salts a part of their base, with which it forms acid urates. Litmus paper is reddened by its moist crystals, or by a hot watery solution. This acid is not volatile, and by dry distillation is decomposed into carbonate of ammonia, urea, cyanuric acid, hydrocyanic acid, etc. By action of strong nitric acid on uric acid in the cold is produced *Alloxan*, $C_4H_2N_2O_4$. *Allantoin*, a compound found in the allantoic liquid of the fetal calf, and whose formula is $C_4H_6N_4O_3$, is producible artificially, together with oxalic acid and urea, by boiling uric acid with lead dioxide and water: $2C_5H_4N_4O_3 + O_2 + 5H_2O = C_4H_6N_4O_3 + 2C_2H_2O + 2CH_4N_2O$. This is a most important result in its physiological bearing, since it shows how uric acid is a probable stage toward the formation of urea, and as explaining a probable source of the oxalic acid, often present in the urine in cases of deficient respiration and aeration; and this view is confirmed by the experiment of introducing uric acid into the stomach or veins of an animal, when the presence of oxalate of lime, and the augmentation of urea, are very soon perceived in the urine.

Uric acid is a very weak bibasic acid, forming with bases two series of salts, the neutral and the acid, of which the former are the more soluble. Among the most important of these urates are: *Acid potassium urate*, $C_5N_4H_3KO_3$, a sparingly soluble white mass composed of minute needles; *Sodium urate*, the chief constituent of the *chalk-stones* of gout; *Ammonium urate*, also sparingly soluble.

Uric acid is widely distributed throughout the animal organism. It occurs not only in the urine of man and carnivorous animals, but is the chief constituent (either free or in combination) of many calculi occurring in the kidneys or bladder, and of numerous urinary sediments. The urinary secretion of birds and reptiles consists almost entirely of urates, which are found also in the excrements of caterpillars, butterflies, beetles, etc., and of many mollusks. Moreover, in very minute quantities it occurs as a urate in healthy blood, in which fluid it has been found in excess in gout and Bright's disease, and is

a constituent of the aqueous extract of the spleen, liver, lungs, pancreas, and brain.

The best and most ready mode of obtaining pure uric acid is from the semi-solid urine of serpents, which consists almost entirely of uric acid and ammonium urate. The mass is boiled with potash, which expels any ammonia that is present; and a stream of carbonic acid is then passed through the strained potash solution, which throws down acid urate of potash. This precipitate is dissolved in water, and decomposed by hydrochloric acid, which throws down the uric acid in minute crystals. It is a glistening, snow-white powder, tasteless, inodorous, very sparingly soluble.

The researches of Wöhler and Liebig on the products of decomposition of uric acid by nitric acid constitute an epoch in organic chemistry. The most important products, some obtained directly, others indirectly, are: *Alloxan*, $C_4N_2H_2O_4$, from which comes a series of acids; *Parabanic acid*, $C_3H_2N_2O_3$; *Alloxantine*, $C_8H_4N_4O_7$; *Murexide*, the ammonium salt, $C_8H_4(NH_4)N_5O_6$, of *purpuric acid*, $C_8H_5N_5O_6$; and *Urea* (q.v.). Of these substances, *murexide* has two special claims to notice: it is used as a pigment in dyeing (though now to a large extent superseded by Rosaniline—q.v.), being probably the old *Tyrian Purple* (see MUREXIDE); and it affords a ready test for a mere trace of uric acid. In using it for the latter purpose, the substance supposed to contain uric acid is heated on a slip of glass with a drop of nitric acid, and carefully evaporated to dryness. If uric acid be present. the residue has a red color, which is converted by vapor of ammonia into a fine crimson; and the addition of a drop of a solution of potash develops a splendid purple tint, which disappears on application of heat.

Uric acid must be regarded, like urea, as a product of the disintegration of the tissues; and it is probable that all the urea which is secreted may have pre-existed in the form of uric acid. Whatever (like excessive exercise or water-drinking) increases the amount of urea, decreases that of uric acid, and *vice versâ*. See URINE.

URIC ACID DIATH'ESIS: medical term denoting the condition in which there is an excess of uric acid, either free or in combination, or both, in the urine. The term in former use was lithic acid diathesis, and the condition is so designated in the older medical works. The urine of persons who have the uric acid diathesis is usually of dark golden color, like brown sherry, and is more acid, of higher specific gravity, and less abundant than the urine in health. When the urine cools, there is usually a deposit or sediment of urates. The sediment is usually spoken of as one of urate of ammonium, but in reality it consists mainly of urate of sodium mixed with urates of ammonium, potassium, and calcium. Its color varies according to the amount and nature of the urine-pigment which tenaciously adheres to it, so that its tints vary

from a whitish yellow to a brickdust red, or even a deep purple. Persons seeing these deposits in their urine when it has cooled are often led to fear that they may aggregate and harden in the bladder, and form a stone. Such fears may, however, be relieved by heating the urine containing the sediment to the temperature of the interior of the body (about 100°), when the fluid will resume its original clearness, and the sediment will disappear.

The occurrence of a uric acid diathesis is denied by some writers, but the term is a convenient one to designate a state of the system marked by certain symptoms of a rheumatic nature and may well be retained until a more accurate knowledge of what this condition is enables us to give it a more scientifically correct name. The persons who suffer from this diathesis are chiefly adults beyond the middle age, and of indolent and luxurious or intemperate habits. As the formation of uric acid deposits is due to over-acidity of the urine, alkalis are the medicines commonly prescribed, and the preparations of potash are far preferable to those of soda, because urate of potassium is perfectly soluble, and will pass off dissolved in the urine, while urate of sodium is a hard, insoluble salt.

Regimen is, however, of far more use than medicine in the uric acid diathesis. The patient should live moderately and very plainly, avoiding acid, saccharine, and starchy matters and fermented liquors. The skin should be made to act freely by friction, and by daily warm or tepid baths. Warm clothing must be used; plenty of active exercise must be taken in the open air; and the healthful action of the bowels and liver secured. It must be recollected that the urates are sometimes thrown down, not from undue acidity of the urine, but simply from that fluid not containing the due quantity of water to hold them in solution. In such cases, a tumbler of pure cold water (not carbonated) drunk night and morning will at once cause the cessation of this morbid symptom.

URICONIUM, *ū-rĭ-kō′nĭ-ŭm:* ancient Roman city of Britain, whose site is about four m. e. of Shrewsbury, and is partly occupied by the village of Wroxeter; about 160 m. n.n.w. of London. The original name seems to have been *Viroconium*, and it is mentioned by Ptolemy as existing in the beginning of the 2d century. The remains of the city show it to have been a place of much importance. The wall, still traceable near the banks of the Severn, inclosed a space more than three m. in circumference. The remains have been explored, and many curious relics discovered of Roman civilization in Britain: rings, hair-pins, and combs being numerous. The human remains found, indicating death by violence or by suffocation, make it probable that the city was sacked and burned by enemies about the 5th century. From about the 12th century the ruins were used as materials

for other buildings: some churches in the neighborhood were built of the old Roman bricks. The most remarkable relic is the *Old Wall,* a great mass of Roman masonry, which appears to have been the side of a great edifice.

URIM, n. *ū'rĭm* [Heb. *urim,* lights; plu. of *ur,* light, flame]: one of the appendages of the breastplate of the high-priest among the anc. Jews. URIM AND THUMMIM, mysterious contrivance in or on the breastplate of the Jewish high-priest, consisting either of the four rows of precious stones on which the names of the 12 tribes were engraved, or more probably of two sensible objects, (conjecturally) symbolizing 'Command' and 'Truth' (LXX.), or 'Utterance' and 'Truth' (Vulgate). [Compare the picture of 'Truth' (Aletheia)—in sapphire or other precious stones suspended from the Egyptian high-priest's breast.] They seem to have been used as a sort of divine oracle—sometimes giving no answer (1 Sam. xxviii. 6). They are mentioned first in Ex. xxviii. 30, and are never mentioned after Solomon's time. There is no real knowledge concerning their original design or the mode of their later (prob. superstitious) use.

U'RINARY SED'IMENTS: all those substances which occur in a non-dissolved state in the urine. Most of these sediments are not formed until after the urine has been discharged and has cooled; some, however, are formed in the urinary organs, and under favoring conditions may give rise to urinary concretions. Hence it is important to ascertain whether a sediment occurring in a specimen of fresh urine has been formed before or after its discharge.

The chemical and microscopical characters of these sediments have a double bearing on the detection of disease: (1) From the investigation of these sediments, we can draw conclusions regarding special changes going on in the general nutrition of the body. They show us that an excessive quantity of certain substances (e.g., uric acid) is being discharged with the urine, and has therefore been produced in the body. (2) They point out to us certain local diseases of the urinary system. Thus, from a sediment containing pus, we infer that suppuration is going on in some part of that system; and the presence of cylindrical casts or tubes in the sediment informs us of certain morbid changes in the structure of the kidneys; and if the ordinary symptoms reveal the presence of stone in the bladder, we can sometimes ascertain its probable nature from the character of the sediment or gravel.

We may divide the urinary sediments generally into the two great groups: (1) the unorganized, (2) the organized deposits. The unorganized sediments include uric acid, the urates (chiefly sodium urate), calcium oxalate, earthy phosphates (viz., calcium phosphate and ammoniomagnesium), crystin, xanthin, hypoxanthin, and tyrosin; while the organized sediments include mucus and epithelial scales, blood corpuscles, pus corpuscles, casts of the

tubes of the kidney, spermatozoa, bacteria, protozoa, etc. Of the unorganized sediments, uric acid, the urates (excepting ammonium urate), and cystin occur only in acid urine; and ammonium urate, ammonio-magnesium phosphate, and calcium phosphate, in alkaline or neutral urine. Oxalates and the organized sediments occur both in acid and alkaline urine; but alkaline urine is the more natural *habitat* for bacteria and protozoa. For details regarding the mode of treatment indicated by the most important of the sediments, see URIC ACID DIATHESIS; OXALURIA; PHOSPHATIC DIATHESIS.

URINE, n. *ū'rĭn* [F. *urine*—from L. *urīna;* Gr. *ouron,* urine: akin to Skr. *vari,* water: Icel. *ur,* drizzling rain]: a fluid secreted by the kidneys and accumulated in the bladder, from which it is discharged. URINAL, n. *ū'rĭ-năl,* a vessel in which, or a place where, urine may be discharged; an erection in a street for public convenience. U'RINA'RIUM, n. *-nā'rĭ-ŭm,* a place where urine may be stored for manure. U'RINARY, a. *-nėr-ĭ,* relating to or found in urine: N. a place for storing urine. U'RINATE, v. *-nāt,* to void or discharge urine. U'RINATING, imp. U'RINATED, pp. URINATION, n. *ū-rĭ-nā'shŭn,* the act of discharging urine. U'RINATIVE, a. *-nā-tĭv,* inducing the discharge of urine. U'RINATOR'IDÆ, n. *-tŏr'ĭ-dē:* family of pygopodous birds, i.e. of carinate birds, web-toed, with legs inserted far behind the middle. U'RINIF'EROUS, a. *-ĭf'ėr-ŭs* [L. *fero,* I bear]: conveying urine. U'RINIP'AROUS, a. *-ă-rŭs* [L. *parĭō,* I produce]: producing urine. U'RINOM'ETER, n. *-ŏm'ĕ-tėr* [Gr. *metron,* a measure]: an instr. for determining the density of urine. U'RINOUS, a. *-nŭs,* or U'RINOSE, a. *-nōs,* pertaining to urine.

U'RINE: fluid secreted or separated by the kidneys from the blood; the principal means of removing the waste products, especially the nitrogenous and saline matters, from the system. It is very complex in composition, varying considerably in different classes of animals, and mainly in accordance with the nature of the food.

Healthy human urine, freshly discharged, is a clear fluid of bright amber color, bitter saltish taste, and peculiar aromatic odor. Its normal reaction is acid, and its specific gravity ranges from 1.015 to 1.025. It is computed that an adult man of ordinary weight (about 154 lbs.) secretes in 24 hours about 52 fluid ounces (rather more than two pints and a half) of urine, the range extending from 40 to 70 ounces; and that these 52 ounces yield, on evaporation, 935 grains of solid constituents, the remainder being water, which is expelled by heat. Of these 935 grains, 520 (or more than an ounce) are composed of urea (q.v.); and 266 of chloride of sodium (or common salt): while the remaining 149 grains are made up of uric acid (q.v.); hippuric (q.v.) acid; sulphuric acid, 32 grains; phosphoric acid, 54 grains; earthy phosphates, 15 grains; ammonia (in the form of hydro-

chlorate), 11 grains; with smaller quantities (in most cases mere traces) of creatinin and creatin xanthine, hypoxanthine, coloring matters, mucus (from the walls of the bladder), iron, silica, and fluorine. The fluid holds also an undetermined quantity of gases (carbonic oxide and a little nitrogen) in solution. The most characteristic and important of these ingredients is the *urea*, the daily excretion of which is modified by various circumstances. On a purely animal diet, Lehmann found that he secreted two-fifths more urea than on an ordinary mixed diet; on a mixed diet, almost one-third more than on a purely vegetable diet; on a non-nitrogenous diet, the amount of urea was less than half the quantity secreted during a mixed diet. The free use of common salt increases the daily excretion of urea, while alcohol, tea, coffee, and tobacco (smoked or chewed) diminish the daily quantity. The daily quantity is increased in many diseases (typhoid fever and many other acute diseases, especially inflammation of the membranes of the brain), while in Bright's disease and a few other disorders it is diminished. The daily amount of excreted *uric acid*, like that of urea, varies with the nature of the food. The mean daily quantity of uric acid excreted by meat-eaters and wine-drinkers has been computed to be 4.5 grains, while vegetarians yielded an average of only 1.48 grains. As an excess of uric acid is likely to give rise to gravel or stone, it should be generally known that the free ingestion of water diminishes its excretion, while at the same time it increases the amount of urea, into which the uric acid is probably transformed by oxidation. The daily amount is diminished by strong bodily exercise, and increased by repose—the reverse of the effects in relation to the urea.

The acid reaction presented by fresh healthy human urine depends mainly on the presence of acid phosphates, though the presence of free acids may occasionally contribute to increase the acidity. To determine the acidity of the collective 24 hours' urine, take a solution of oxalic acid of known strength, and ascertain the relative quantities of a solution (of definite strength) of caustic soda required to neutralize equal volumes of the urine, and of the oxalic acid solution. In this way it is found that the total quantity of free acid in the daily urine of a healthy man corresponds in neutralizing power to about 36 grains of oxalic acid. The degree of acidity varies in different parts of the day. The respective acidities of the secretions of the kidneys and stomach are considered to stand in an inverse relation to one another; so that the urine thus loses its acidity, and may even become alkaline during stomachal digestion. It has been found that the effect of a meal on the acidity of the urine begins to show itself in the second hour afterward, is most marked during the next three hours, and disappears by the end of the sixth hour, the fluid being almost always positively alka-

line during the third and fourth hours. Independently of this periodic alkalinity, the urine may be made alkaline at will by administration of caustic alkalis, their carbonates, or their salts with organic acids (citrates, tartrates, etc., such as occur in many fruits); while after administration of acids the acidity is much increased.

In disease the urine may contain either only its ordinary ingredients in abnormal proportions, or ingredients not occurring in the healthy fluid. Thus, there may be excess or diminution of urea; excess of uric acid; diminution of chloride of sodium; an excess of coloring matter or of mucus, etc.; or, on the other hand, the urine may contain albumin, sugar, oxalates, fat, leucin and tyrosin, bile-pigment, biliary acids, etc.

As to the urine of mammals generally, that of the Carnivora is clear, of light-yellow color, disagreeable odor, nauseous taste, and acid reaction: it contains much urea, little pigment, and little or no uric acid. The urine of the Herbivora is turbid, yellow, of less unpleasant odor, and alkaline. In addition to urea, it contains hippuric (but no uric) acid, alkaline lactates, carbonates of potassium and of the earths, calcium oxalate, and a small quantity of phosphates. By reversing the natural food of these classes, we reverse the characters of the urine.

The urine in many forms of disease becomes turbid on cooling, and soon deposits a sediment; and even healthy urine, after a few days' exposure to the air, loses its clearness, and throws down a deposit of mucus and various kinds of crystals. See URINARY SEDIMENTS.

U'RINE, INCONTINENCE OF, or ENURE'SIS: a disorder, far more common in childhood than later in life. The child affected—perhaps with no other bad symptoms—is in the habit of discharging urine in bed during sleep, usually without being wakened by the act. This may take place once or several times during the night, and sometimes there is an interval of a night. The habit may often be broken by proper domestic management, as by withholding any excess of fluids before going to bed, and by waking it and making it discharge the contents of the bladder when the elder members of the family retire to bed. If such means fail, recourse must be had to medical advice. A band around the body, knotted where it crosses the sacrum, which prevents the patient from lying flat on the back, and consequently prevents the urine from gravitating toward the most irritable part of the bladder, is often useful; and cold douches to the spine, with internal use of chalybeates, are frequently serviceable. The most certain remedy, however, is extract of belladonna, to be given only under medical advice. Any attempt by mechanical pressure to prevent the passage of the urine is to be utterly reprobated.

URME'A, or URUMI'A. See OROOMIAH.

URN, n. *ėrn* [F. *urne*—from L. *urna,* a water-pot, a

vessel for drawing water: It. *urna*]: a vessel of a roundish form bulging out or swelling in the middle and having a foot or feet; a vessel for keeping water hot at table; a tea-urn; a vessel in which the ashes of the dead were kept in anc. times; in *bot.*, the theca or spore-case of mosses. URNAL, a. *ėr'năl*, of or pertaining to an urn.

URODELA, n. plu. *ū'rō-dē'lă* [Gr. *oura*, a tail; *dēlŏs*, visible, apparent]: in *zool.*, the tailed amphibians, as newts, etc.

UROGENITAL, a. *ū'rō-jĕn'ĭ-tăl* [Gr. *ouron*, urine, and Eng. *genital*]: connected with, or relating to, the urinary and genital organs.

UROHYAL, a. *ū'rō-hī'ăl* [Gr. *oura*, the stern, the tail; and Eng. *hyoid*, which see]: in fishes, a backward process of the hyoid bone.

UROSCOPY, n. *ū-rŏs'kŏ-pĭ* [Gr. *ouron*, urine; *skopĕō*, I view]: the inspection of the urine in diagnosing disease.

URQUHART, DAVID: Scottish political economist: b. Brackbanwell, Scotland, 1805; d. Naples, Italy, 1877, May 16. He was educated at Oxford, entered the diplomatic service and later traveled extensively in the east. He was secretary of the British legation at Constantinople in 1835-6, but resigned that position because of his opposition to the policy of Lord Palmerston, which he considered as subservient to the ambitions of Russia. He was member of parliament for Stafford in 1847-52 and maintained a vigorous opposition to Palmerston, his parliamentary attacks supplementing his writings for the press, and succeeding in instilling into the public mind a distrust of Russia's eastern policy. His works include: *England, France, Russia and Turkey* (1835); *The Spirit of the East* (2 vols., 1838); *Progress of Russia in the West, North and South* (1853); *Recent Events in the East* (1854), etc.

URQUIZA, JUSTO JOSÉ DE: Argentine soldier and politician: b. near Concepcion del Uruguay (now in Entre Rios, Argentina) 1800, Mar. 19; d. 1870, Apr. 11. He was of mixed Spanish and Indian blood, and during the war in La Plata in 1835-42 gradually rose in influence until he became a general of division under Rosas, dictator of Buenos Ayres. In 1844 he commanded the army sent against Uruguay, and in 1845, at the battle of India Muerte, he defeated Ribera. He was elected governor of Entre Rios in 1846, as leader of the federalist party. His administration of affairs was directed rather to his own glory and gain than to any benefit for the people, but he contrived to maintain a peaceful and prosperous condition of the country while strengthening his power, meanwhile acquiring great wealth. In 1851 he turned against Rosas, allied his forces with Brazil and Montevideo, and marched into Uruguay. He forced the capitulation of Oribe Oct. 8, 1851, then invaded Buenos Ayres,

and on Feb. 3, 1852, defeated Rosas at Monte-Caseros. Urquiza was proclaimed provisional dictator and after the adoption of a federal constitution by the provinces (excepting Buenos Ayres) he was, in 1853, elected president for a term of six years. In 1859 he forced Buenos Ayres to join the confederation, and after the expiration of his term of office took command of the army and endeavored to quell the revolt which had arisen in that country. He was defeated by Mitre at Pavon Sept. 17, 1861, the result being the abandonment of the federalist constitution for the one since in force. He retired to Entre Rios, where he acted as governor, exercising semi-dictatorial powers, though nominally under the authority of the central government. In 1870 a formidable revolt arose, headed by his son-in-law, Gen. Lopez Jordan, and Urquiza was attacked in his palace and killed.

URSA, n. *ėr'să* [L. *ursa*, a she-bear, a constellation]: the bear. URSIDÆ, n. plu. *ėr'sĭ-dē*, the bear-tribe, a family of carnivorous animals (see BEAR). UR'SIFORM, a. *-fawrm* [L. *forma*, a shape]: having the shape of a bear. UR'SINE, a. *-sĭn* [L. *ursīnus*]: pertaining to a bear or resembling it; grizzly.

URSA MAJOR, or GREAT BEAR: a northern constellation whose seven brightest stars are well known as Charles' Wain, as the Plow, the Dipper, and sometimes as the Butcher's Cleaver. Two of these seven stars are called the pointers, because they and the pole-star lie nearly in a right line, and these stars direct an observer to the pole-star. Ursa Minor, or Little Bear, a smaller constellation of the same configuration as Ursa Major, lies near the north pole.

UR'SIDÆ: the family of the bears.

UR'SINE DAS'YURE. See DASYURE.

URSINUS COLLEGE: located at Collegeville, Pa. It was incorporated in 1869, and was first opened to students in 1870; Freeland Seminary, whose property was purchased for the college, was incorporated into the college as its preparatory department; in 1871 a theological department was organized. The college is nonsectarian in its control, the board of directors being self-perpetuating; it is, however, affiliated with the Reformed Church in the United States, and the theological professors are ministers of that church. The organization of the college includes the college department, the academy, the School of Theology, and the summer session. The School of Theology has been located in Philadelphia since 1898. The students number about 300.

URSON, *ėr'son:* quadruped (*Erythizon dorsatum*) nearly allied to the Porcupine, and often called the Canada Porcupine (see PORCUPINE). The urson is about the size of a small hare. It is found as far south as Virginia and Kentucky, and as far north as lat. 67°. Its quills

are dyed by the Indian women and worked into ornamental articles of various kinds.

URSUA, or Orsua, Pedro de: Spanish soldier: b. Ursua, Navarre, about 1510; d. Machiparo, on the Upper Amazon, 1561, Jan. 1. He accompanied a Spanish expedition to New Granada, was governor of that country in 1545-6, and later led two expeditions from Bagotá in search of El Dorado. He commanded a force against the Cimarrones (fugitive slaves) on the Isthmus of Panama in 1555-7 and reduced them to subjection. In 1559 he was given command by the viceroy of Peru of an expedition to conquer the 'kingdom' of the Omaguas, near the head of the Amazon. The purpose of the viceroy was really to rid himself of the unruly soldiers attracted to Peru by the civil wars. The ruse succeeded. Ursua adopted the title of 'governor of Omagua and El Dorado,' and set forth with several hundred of the turbulent soldiers in his train. He reached the Upper Amazon by way of the Moyobamba and the Ucupali, but at Machiparo a conspiracy was formed among his followers, led by Lope de Aguirre, and he was murdered.

URSULA, Saint: virgin martyr, according to the legend, a daughter of a prince in Britain. She was put to death at Cologne by a horde of Huns, some say in 384, others in 453, together with 11,000 virgins who accompanied her. According to another reading the number of her companions was only eleven. The Roman martyrology mentions the saint and her virgin companions without stating their number. Some bones, said to be those of herself and her companions, are still shown to visitors. The day dedicated to her honor is the 21st of October. Saint Ursula was the patroness of the Sorbonne.

URSULINES, n. plu. *ėr'sū-līnz:* in the *Rom.Cath. Chh.*, a religious order of women, founded in honor of St. Ursula in the first half of the 16th century by St. Angela Merici, who formed at Brescia an association of young women bound by vow to tend the sick, instruct children, relieve poverty, and engage in similar works of charity. After a time, a rule, in 25 chapters, was projected by Angela, and finally approved by the bishop of Brescia, Cardinal Francis Cornaro. Angela was chosen as the first superior 1537, the community even then numbering 76 sisters. During the lifetime of Angela, and for more than 20 years after her death, 1540, the congregation was confined to the diocese of Brescia; but 1565 a house was opened at Cremona; and, with approval of Popes Gregory XIII. and Clement VIII., the order was spread over many dioceses of Italy. It was warmly encouraged by St. Charles Borromeo, and, at his death, there were 28 convents of the order in his diocese. Soon afterward it was established in France, where the sisters first formally added to their religious vows the instruction of female children—which has been their chief characteristic. The

order was introduced into Savoy by St. Francis de Sales 1635; and 1639 a convent was opened in Quebec, Canada; at Vienna 1660, and at Freiburg, Kitzingen, and Prague soon afterward. The Ursuline sisters have several educational establishments in Ireland, in England, and in the United States. To the Ursulines belongs the honor of having been mainly instrumental in maintaining among Roman Catholics the education of girls of the higher order through the 17th and 18th centuries. In this work they have found many competitors among the younger sisterhoods of modern times. See *Journal des Illustres Religieuses de l'Ordre de Ste. Ursule,* 4 vols., 4to (1690); *Chroniques de l'Ordre des Ursulines,* 2 vols. (Paris 1676).

URTICACEÆ, *ėr-tĭ-kā'sē-ē:* natural order of exogenous plants, consisting of trees, shrubs, and herbs, natives of almost all parts of the world. According to many botanists Urticaceæ includes about 600 known species: others restrict it by separating from it several distinct orders, reducing the species to about 300, of which the common nettle may be regarded as the type. The leaves are alternate, furnished with stipules, and generally very rough, sometimes with stinging hairs. The inflorescence is various; the perianth usually divided, but sometimes a mere scale; the stamens inserted into the perianth, equal in number to its segments when it is divided, and inserted at their base; the ovary free, one-celled, containing a single ovule. The fruit is a kind of nut, surrounded by the persistent and sometimes fleshy perianth, sometimes winged. Under this are comprehended *Cannabinaceæ, Ulmaceæ, Moraceæ,* and *Artocarpaceæ,* as well as the restricted Urticaceæ, which have filaments curved in bud, and turning backward elastically when the anthers are bursting, the fruit an unopening nut. The juice of the restricted sub-order *Urticeæ* is watery, not milky; the wood in the arboreous or shrubby species, all tropical, is remarkably soft and light. The fibre of the bark of some is valuable. It is among the restricted Urticaceæ that species covered with stinging hairs are found. See BŒHMERIA; NETTLE; NEILGHERRY NETTLE; PELLITORY; HEMP; HOP.

URTICACEOUS, a. *ėr'tĭ-kā'shŭs* [L. *urtīca,* a stinging nettle—from *uro,* I burn]: having the character of a nettle. UR'TICAL, a. *-kăl,* pertaining to or allied to the nettles. UR'TICA'RIA, n. *-kā'rĭ-ă,* Nettle-rash (q.v.); a transient inflammation of the skin, characterized by the eruption of small, round, oval-like elevation of a whiter or redder tint than the healthy skin. UR'TICATING, a. *-kā-tĭng,* stinging, as a nettle. UR'TICA'TION, n. *-kā'shŭn,* stinging, as that of a nettle; the process of stinging with nettles.

URUGUAY, *ô-rô-gwī'* (República Oriental del Uruguay): smallest of the independent countries of South America, is bounded on the n. and n.e. by Brazil, on the

e. by the Atlantic ocean, on the s.e. and s. by the Atlantic ocean and the estuary of the Rio de la Plata, and on the w. by the Argentine Republic. Its territory extends from lat. 30° s. nearly to lat. 35° s., and the location of its principal city (or, more precisely, of the cathedral at Montevideo) is given as lat. 34° 54′ 33″ s., and long. 58° 32′ 32″ w. Total area of the republic, 72,172 sq.m.

Political Divisions.—The departments (with the population of each on Dec. 31, 1901) are as follows: Artigas, 27,001; Canelones, 86,735; Cerro Largo, 37,236; Colonia, 51,563; Durazno, 38,111; Flores, 16,180; Florida, 45,248; Maldonado, 27,035; Minas, 37,152; Montevideo, 273,665; Paysandu, 44,411; Rio Negro, 23,127; Rivera, 25,349; Rocha, 30,428; Salto, 45,754; San José, 42,181; Soriano, 38,851; Tacuarembó, 38,789; Treinta y Tres, 25,800.

Topography and Physical Geography.—The most elevated point in the republic is somewhat less than 2,000 feet above sea-level; the so-called mountains are, therefore, to be regarded rather as hills, which sometimes form chains—such as the Cuchilla Grande, which extends across the country; the Santa Ana range, between Brazil and Uruguay; the Cuchilla de Belén, and Cuchilla de Haedo—but elsewhere give to the region, especially the northern districts, an irregular rolling or undulating surface. Forests or groves cover the hills in the north and generally extend along the banks of the numerous small streams (*arroyos*) and the larger water courses. The soil in the s.w. is of uncommon fertility, being composed, it is said, of detritus of great depth and rich alluvial deposits; the s.e. and s. have grassy slopes and good pasture lands, the hills here forming a bold line along the shore of the Rio de la Plata, but not extending to the Atlantic coast. There are few natural harbors, and the rivers are: the Uruguay (q.v.), Santa Catharina, about 1,000 m. in length; the Rio Negro, a branch of the Uruguay.

Mineral Resources.—Gold, silver, tin, cinnabar and iron are to be found, and there are deposits of coal, of not good quality. Diamonds, agates, amethysts and topazes are among the precious stones found, but not in great numbers.

Flora and Fauna.—Hard and durable woods are: the ñandubay (which, instead of decaying when buried in the earth, becomes petrified), urunday, lapacho, coronilla, espinello, quebracho, arazá, algarroba, and lignum vitæ. Among the softer woods are the willow and acacia. Palms abound, and the poplar, pine, cypress, oak, eucalyptus, cedar, magnolia, and mulberry have been successfully acclimated. Yerba maté is indigenous, and 430 species of medicinal plants have been classified. As for animal life, the most interesting item is that relating to the seals, large numbers of which live and breed on the islands near the coast, especially Lobos and the Castillos group. More than three-fifths of the seals at these rook-

eries are believed to be of the fur-bearing variety, and the islands are 'strictly preserved,' it is said, 'no one being allowed to land upon them except the sealers—experienced men—during the killing month'; nevertheless 21,245 skins and 49,070 litres of oil were 'produced' on Lobos and the Castillos group during the year 1901. The mainland fauna includes the deer, otter, wild hog, carpincho, fox, ounce, wildcat, ant-eater, etc. There are over 500 species of avifauna, including the crane, stork, swan, and wild turkey.

Agriculture and Stock Raising and Commerce.—Wheat, flax, barley, oats and sugar-beets are raised in immense quantities. There are about 30,000 farmers and tenants engaged in agriculture, and about 2,500 of these raise grapes. There are over 30,000,000 head of stock, chiefly sheep and cattle. The exports approximate $30,000,000, and the imports about $25,000,000.

Weights, Measures, and Money.—The *libra* = 1.0143 pounds; *arroba* = 25.35 pounds; *cuadra* = 2 acres (nearly); *suerte* = 2,700 *cuadras; fanega* = 3.888 bushels; double *fanega* = 7.776 bushels. The metric system has been officially adopted. Gold is the monetary standard; the unit is the *peso,* which has the value of $1.034 in United States currency. Practically, the medium of exchange consists of foreign gold coins and the silver peso and its divisions.

Government.—The legislative branch is composed of the Senate and Chamber of Deputies, the former having one member for each department (that is, 19 members), and the latter one for each 3,000 voters. The term of a senator is six years, and that of a deputy is three. In most respects the powers of this congress or general assembly are similar to those of the congress of the United States, but they extend much farther in certain directions, namely, to the granting of pardons and amnesties in extraordinary cases and electing the president of the republic (see below). The judicial power is exercised in several courts of first instance (distributed as civil, criminal, for cases affecting the treasury, for commercial cases, police, and departmental), courts of appeal, and the High Court of Justice. The executive power is vested in a president, who is chosen for a term of four years by a majority of the members of the legislature in joint session of its two chambers. The president is ineligible for re-election during two successive terms; he is aided by a cabinet of five, who are chiefs of the ministries of government, *Fomento* (Promotion of the Public Welfare), Finance, Foreign Affairs, and War and Navy. As in the United States, the vice-president is *ex officio* president of the senate, congress meets annually, etc. Each department has an administrative council whose members are chosen by popular vote, and a governor appointed by the national executive.

Army and Navy.—On a peace footing the army formerly contained about 3,200 private soldiers and 232

officers; the national guard little more than 20,000. But these numbers were greatly increased in 1903-4, owing to the revolutionary movement (see below: *History*). The navy consists of three gunboats and a few auxiliary vessels.

Education and Religion.—In addition to the establishments for higher education at Montevideo (q.v.), there are in the republic about 600 elementary free schools, with about 55,000 pupils and 1,160 teachers; 332 private schools, with about 880 teachers; also many religious seminaries. The religion established by the constitution is the Apostolic Roman Catholic, but all other forms are tolerated, and the financial aid given by the government to the church is small.

Population.—The distribution of inhabitants in the several departments is shown above. The total population, including 9,961 transients, was 964,577 on Dec. 31, 1901; increase in that year 28,457.

History.—On Oct. 8, 1515, Juan Diaz de Solís sailed from Spain; he explored the estuary of the Rio de la Plata, and was slain, with some of his companions, by natives of the Charrua tribe. On Feb. 2, 1520, Magellan sailed from the Rio de la Plata, after having explored the Paraná and Uruguay rivers in his search for a waterway across Terra Firma. On Apr. 1, 1526, Sebastian Cabot set out from Seville; he ascended the Paraná to the great falls and the Paraguay to the mouth of the Bermejo. In 1527 Cabot ordered the construction of a fort in the country e. of the Uruguay river. The opposition of the natives to the Spanish settlements was fierce and, during a century, successful; in 1603 a veteran Spanish force was routed in a pitched battle by the Charruas. In 1624 the oldest of the towns which now exist in Uruguay was founded on Rio Negro. The so-called 'Banda Oriental' (that is to say, the region e. of the Uruguay river) was the subject of contention between Portugal and Spain. In 1680 the Portuguese colonists of Brazil founded Sacramento (now Colonia), thus confronting the Spaniards at Buenos Ayres. In 1723 the Portuguese fortified the Bay of Montevideo, but surrendered to the Spaniards in the following year, and families from Buenos Ayres established themselves at Montevideo in 1726. In 1735-7 Colonia was besieged by the Spaniards. In 1761 it capitulated, but was restored to Portugal by the Treaty of Paris 1763. This did not put an end to Spanish colonization there; on the contrary, immigration from the n. of Spain and from Spanish settlements across the river continued throughout the 18th c. On April 26 and May 28, 1811, José Artigas, leader of the revolutionary party in the Banda Oriental, routed the Spanish forces; a confederation of the settlements e. of the great river was formed, with Artigas as 'Protector.' But the Portuguese captured Montevideo and Maldonado, and in 1822 the region in dispute was organized as the Cisplatine Province of Brazil. Artigas took

refuge in Paraguay, where he died. Other refugees, however, who had gone to Buenos Ayres, returned to start a rebellion in the Cisplatine Province, and on Aug. 23, 1825, issued a declaration of independence. On Sept. 24 and Oct. 12 in the same year the Brazilians were defeated. Then the Argentine government intervened. On Feb. 9 and July 30, 1826, Admiral Brown, commanding the Argentine squadron, failed in his attempts upon the Brazilian fleet; but in 1827, Feb., succeeded in destroying the expedition sent by the Brazilian admiral Lobo into the Uruguay river, and on the 20th of that month the Marquis of Barbaceno, commanding Brazilian forces, was defeated at Ituzaingo. On Aug. 27, 1828, the Treaty of Montevideo was signed, and the *República Oriental del Uruguay* was created, both Brazil and Argentina renouncing their claims to the country thenceforth to be known as the Eastern Republic of the Uruguay, or simply Uruguay. On July 18, 1830, the constitution was adopted, and a new declaration of independence issued—this time guaranteed by both of the strong neighboring states. But, unfortunately, from that day to this the political parties—the 'Colorados,' or Reds, and 'Blancos,' or Whites—have kept alive the traditions of home-bred strife. Thus, in 1842, a political chief secured Argentine support, and laid siege to Montevideo; in 1862 ex-President Flores, 'Colorado' leader, made use of Brazilian troops to take Paysandú. On Feb. 25, 1865, Flores with his Brazilian allies took forcible possession of the capital and of the government; quite naturally, therefore, Uruguay was drawn into the coalition formed to resist the dictator of Paraguay, Francisco Lopez (see PARAGUAY). On Aug. 17, 1865, Flores defeated a division of Paraguayans at Yatay; three years later he was assassinated during a 'Blanco' rebellion at Montevideo; and ex-President Berro, 'who, though not one of the assassins, was arrested in the street with arms in his hands,' was executed, with other rioters. The revolution of 1870-3 ended in a 'Colorado' triumph. Of the long series of disturbances which have followed, marking the efforts of 'Blancos' to regain power, only the last need be mentioned at present—the serious revolution which broke out in 1903, Mar., and continued in 1904, despite the increased military force of the government.

Consult: Burmeister, *Reise durch die La Plata-Staaten; Códigos y Leyes, Usuales de la República Oriental del Uruguay* (2 vols., Montevideo, 1894); *Handbook of Uruguay*, and other Bulletins of the Bureau of American Republics.

URUGUAY, *ô-rô-gwī'* or *ū'rô-gwā*, RIVER: stream having its sources in the Sierra do Mar, state of Santa Catarina, Brazil; in s. lat. 28°, w. long. 50°. First it flows w., separating the two states Rio Grande de Sao Pedro and Sao Paulo; then taking a s. course, it forms the boundary between Brazil and the Argentine state of Corrientes; from s. lat. 30°, w. long. 58°, it separates

Uruguay from Corrientes and Entre Rios, falling into the Rio de la Plata at the head of its estuary. Its length is 1,000 m.; it is navigable for steamers from its mouth to the Great Falls (Salto Grande), 250 m.; above the Falls the Uruguay is navigable for vessels of not more than 5 ft. draught. The Uruguay is subject to great and sudden rises; and its September and October rise is 20 ft. on the average.

URUMTSI, *ô-rôm'tsē:* city of s. Dzungaria, in a fertile district at the n. base of the Thian-Shan Mts. Urumtsi has large trade with the adjoining regions.—Pop. about 150,000.

URUS, n. *ū'rŭs* [L. *urus*—from OHG, *ur*, a bison: It. *uro:* F. *ure*]: animal of the ox kind, which anciently inhabited the forests of central Europe, and is described by Cæsar (*Bell. Gall.* VI. 28) as common in the great Hercynian Forest. The Urus is described by Cæsar as of elephantine size, and of great strength, swiftness, and fierceness. He states that the horns were very different from those of the oxen of Italy—large, spreading, and sharp. This character is found in the wild cattle of Chillingham and other parks in Great Britain, and in some Highland breeds of oxen; and it seems probable that the Urus was the wild original of the domestic ox, and not a bison, nor any now extinct species, as some authors maintain. See monograph by Storer on the *Wild Cattle of Great Britain* (1879).

URVASÎ. See PURURAVAS.

US, pron. *ŭs* [AS.]: the obj. case of the pronoun *we.*

USAGE, *ū'zāj,* in Law: any practice generally adopted among law-abiding citizens, merchants, traders, etc., which is not contrary to law. In construing the laws of trade, contracts, etc., courts take cognizance of 'known, certain, uniform, reasonable' usage as a means of determining the true intent of parties, the nature and extent of contracts, etc.

USBEGS, *ŭs'bĕgs,* or UZ'BEKS: people of Turkish race, who, at the close of the 15th c., invaded and conquered the numerous principalities into which Turkestan was divided, and have ever since maintained dominion over the country. At the present day they are mostly a settled people, scattered over Russian, Independent, and Chinese Turkestan, occupied chiefly in agriculture and trade. The most probable supposition regarding their origin is that they came from Kiptchak, and assumed the name of Usbegs, from Usbeg, one of their chiefs. The Usbegs of Khiva, Bokhara, Khokan, and of Chinese Turkestan, differ greatly in language, manners, and customs. Those of Khiva speak a dialect of the Turkish, are honest and generous, and, free from the treachery and duplicity so characteristic of oriental civilization, are fond of music and poetry; and, though zealous

Mohammedans, retain many of their ancient heathen usages. They pride themselves on the purity of their Usbeg descent, but most of them show traces of admixture of Iranian blood. The Usbegs of Bokhara have become largely mingled with the Tajiks, and have consequently lost many of their national characteristics. Those of Khokan are very different from the others, and are as much Kirghis, Kiptchaks, and Kalmucks as they are Usbegs.—The fact that the Usbegs have been the dominant race in Turkestan for more than 350 years has given the name such a prestige of nobility and good-breeding that it is generally assumed by such members of other races as settle in cities.

USE, n. *ūs* [L. *usus*, use, employment, practice; *usus*, used; *utor*, I use: F. *us;* It. *uso*, use, usage]: act of employing in any manner; state of being converted to any purpose; occasion or need to employ; the quality which makes a thing proper for a purpose; benefit; advantage; habit; custom; in *law*, profit; benefit; in *OE.*, common occurrence; usury; interest paid for money. USE, v. *ūz* [F. *user*—from mid. L. *usārĕ*, to use]: to employ; to apply or handle for some purpose; to consume; to accustom; to render familiar by practice; to inure; to be accustomed; to be wont; to treat; to practice; to frequent. USING, imp. *ū′zĭng*. USED, pp. *ūzd*. USABLE, a. *ū′zā-bl*, that can be used. USAGE, n. *ū′zāj*, a series of actions done by one person toward another which affect him for good or evil; treatment; custom; practice; habit; manner of using, as a word or phrase. USANCE, n. *ū′zăns*, the period after date allowed by custom for the payment of bills of exchange drawn on some distant place; owing to improved means of communication, the tendency is to shorten this period, and usance now runs commonly from 14 days to 4 months; in *OE.*, proper employment; interest. USEFUL, a. *ūs′fûl*, conducive to a good end; suited or adapted to the purpose; profitable; serviceable. USE′FULLY, ad. *-lĭ*. USE′FULNESS, n. *-nĕs*, the state or quality of being useful. USE′LESS, a. *-lĕs*, worthless; fruitless; unavailing; ineffectual. USE′LESSLY, ad. *-lĭ*. USE′LESSNESS, n. *-nĕs*, the state or quality of being useless. USER, n. *ū′zĕr*, one who uses. USUAL, a. *ū′zhû-ăl*, customary; such as ordinarily occurs. U′SUALLY, ad. *-lĭ*, commonly. U′SUALNESS, n. the state of being usual. IN USE, in employment; in customary practice. USE AND WONT, the common or customary practice. USE-INHERITANCE, inheritance of the effects of use or of disuse in organisms. TO USE UP, to leave nothing of; to exhaust; to tire out thoroughly.—SYN. of 'use, n.': convenience; help; practice; habit; usage;—of 'usefulness': utility; serviceableness; value; advantage; benefit; profit.

USE, in Law: the old name for *Trust* (q.v.). Uses and trusts correspond to the *fidei commissum* of the

Roman law. A use was a confidence reposed in another who was tenant of the land, or *terre-tenant,* that he should dispose of the land according to the intention of the *cestui que use,* or him to whose use it was granted, and suffer him to take the profits.

USEDOM, *ô'zĕh-dom:* island belonging to Prussia; at the mouth of the Oder and with the island of Wollin shutting off Stettiner-Haff from the Baltic. It is of very irregular shape, being much indented by branches of the Haff; is 34 m. in extreme length, and 15 m. broad; about 206 sq.m. On its n.e. side is the port of Swinemünde; on the s.w. side is the small town of Usedom.—Pop. of island 33,000; of town 2,100.

USE AND OCCUPATION, in Law: technical name for the beneficial enjoyment of premises by a tenant who occupies the real property of another. In all cases where a person has had use and occupation of another's premises, with the assent of the owner, an action lies for the value thereof, which value corresponds to rent under an ordinary lease. Hence, where it is doubtful whether there has been a valid lease executed between the parties, the landlord can recover rent under the head of *use and occupation.*

USHANT, *ŭsh'ant* (*F. Ouessant*): island in the Alantic Ocean, belonging to France, and included in the department of Finisterre, from whose w. coast it is distant about 17 m. It is the largest of a small group of islets called *Ilcs d'Ouessant,* and has 7 sq.m. The coasts are escarped and difficult of access; the soil is fertile. The inhabitants are employed in fishing, and in rearing cattle and horses.—Pop. 2,400.

USHAS, *û'shas* [from Skr. *ush,* 'to shine, to burn,' and kindred with the Greek *ēōs* or *heōs* and the Latin *aurora,* 'the Dawn']: one of the female deities of the Vedic religion of India (see INDIA—*Religion*), and among these is invoked with special predilection by the poets of the R'igveda hymns. Ushas is one of the most pleasing goddesses of the ancient Hindu pantheon. She is frequently addressed as 'the daughter of heaven,' 'the daughter of night' (night being the precursor of the dawn). She is sister of the two luminous deities *Bhaga* and *Varun'a,* and faithful wife of *Sûrya,* the sun. Another god who originally on physical grounds is associated with Ushas is *Indra* (q.v.), ruler of the bright firmanent. She is associated also with Soma (q.v.).

USHER, n. *ŭsh'ĕr* [OF. *ussier*—from L. *ostiārĭus,* a door-keeper—from *ostĭum,* a door: It. *usciere*]: an official who introduces strangers to a presence-chamber or who walks before a person of rank; a person who meets people at the entrance of a hall, church, theatre, or the like, and escorts them to seats; an inferior officer in some English courts of law; a subordinate teacher in a school: V. to give entrance to; to accompany and intro-

duce; to introduce. USH'ERING, imp. USH'ERED, pp. *-ėrd.* USH'ERSHIP, n. the office of an usher. USHER OF THE BLACK ROD, an officer of the order of the Garter (q.v.), who is first gentleman usher of the court in Great Britain, and thus one of the chief officers of the house of peers. The rod from which his title is derived is 3½ ft. long, of ebony, mounted with gold. It is one of the functions of the gentleman usher of the black rod, or of his deputy, known as the yeoman usher of the black rod, to request the attendance of the commons in the house of lords when the royal assent is to be given to bills by the sovereign or by lords commissioners; also to execute orders of commitment for breach of privilege and contempt, and to assist at the introduction of peers, and other ceremonies of the upper house. USHER OF THE GREEN ROD, one of the officers of the order of the Thistle, whose duties consist in attendance on the sovereign and knights assembled in chapter, and at other solemnities of the order. The rod is of green enamel, 3 ft. in length, ornamented with gold.

USH'ER, HEZEKIAH: American bookseller: b. England about 1615; d. Boston, Mass., 1676, March 14. Thomas (*History of Printing* 1810) calls him 'the first bookseller in English America of whom I can find any account.' He was in Cambridge as early as 1639, but in 1646 set up business in Boston. As agent of the Society for the Propagation of the Gospel, he purchased the types and paper for the printing of Eliot's *Indian Bible* (see ELIOT, JOHN), and directed all the transactions in connection therewtih. This was the first Bible printed in the colonies. Usher was a founder of the Old South Church of Boston (1669).

USHER, or USSHER, JAMES: Irish prelate, Archbishop of Armagh: b. Dublin 1581; d. Reigate, Surrey, 1656. He took orders in 1601, and in 1607 was appointed professor of divinity at Trinity College, Dublin, and chancellor of St. Patrick's cathedral; in 1620, bishop of Meath; in 1623, Irish privy-councillor, and primate of Ireland in 1624 as archbishop of Armagh. His notions of church government verging toward Presbyterianism, his enemies took advantage of this to attempt to destroy his credit with James I.; but he enjoyed to the last the esteem of that king. He attended Strafford in prison and at his execution. During the Civil war he was a stanch adherent of Charles I., and witnessed the execution of the king. After that event he experienced civility and flattering promises from Cromwell, who finally ordered that he should be buried in Westminster Abbey. Archbishop Usher carried on an extensive correspondence with the learned in various parts of Europe, and was a man of great erudition. He wrote a number of works, the principal of which are the *Annals of the Old and New Testament*, which forms the basis of the biblical

chronology in King James' version of the Bible; *Britannicarum Ecclesiarum Antiquitates.*

USHER, John: American colonial executive: b. Boston, Mass., 1648, April 27; d. Medford, Mass., 1726, Sept. 1. He was son of Hezekiah (q.v.). As a bookseller he was the first in the colonies to obtain a copyright for printing, the work being a revised edition of the laws of Massachusetts. He was colonel of militia, treasurer of Massachusetts, and agent in London for the Massachusetts colony for the purchase from Sir Ferdinand of Gorges or the title for the district of Maine (1677). In 1692-7 he was lieutenant-governor of New Hampshire, and again from 1702 till his death.

USKUP, *ôs'kŭp,* Skopia, or Skoplie, European Turkey: the capital of a sanjak in the vilayet of Kosovo, situated on the river Vardar, 120 miles northwest of Saloniki, on the railroad from Saloniki to Belgrade and the branch line to Mitrovitza. It has a handsome mosque, a castle, a Byzantine aqueduct, and a recently established trade-school. The chief manufactures are leather, metal ware and cloth, and the town is an important trade centre for grain, wool and fruit.—Pop. 20,000.

US'NEA: a genus of fruticose lichens, attached only in one place, with a shrub-like appearance. They are often pendulous, as is the old man's beard (*U. barbata*) which hangs in long tassels and festoons from the bark of trees or their branches, is gray-hued, and resembles somewhat in habit the *Tillandsia. Usnea* is also known as necklace-moss, or hanging moss.

USPALLATA PASS, Chile: a pass over the Andes between Chile and Argentina, 90 miles east of Valparaiso, and at the southern base of Mount Aconcagua. Its highest point is about 12,800 feet above the sea, and the Trans-Andine Railroad passes over it.

USQUEBAUGH, n. *ŭs'kwĕ-baw'* [Gael. *uisge-beatha,* lit., water of life]: a strong distilled spirit, slightly aromatic, made in Ireland and Scotland; whisky.

USTICA, Italy: a small island in the Tyrrhenian Sea, 40 m. n. of Palermo, Sicily. It is 3 m. long and 2 m. broad, and has a fortified harbor with a lighthouse.—Pop. (1901) 1,992.

USTILA'GO. See Smut.

USTULATE, a. *ŭs'tū-lāt* [L. *ustulātus,* pp. of *ustulārĕ,* to scorch—from *urĕrĕ, ustum,* to burn]: in *bot.,* blackened as if burned. Us'tula'tion, n. *-lā'shŭn,* the roasting or drying of moist substances to prepare them for pulverizing; the burning of wine.

USUAL. See under Use.

USUCAPTION, n. *ū'zū-kăp'shŭn* [L. *usucaptus,* pp. of *suscapĕrĕ,* to acquire ownership of a thing by long use—from *usus,* use; *capĕrĕ,* to take]: in *civil law,* the title

or right to property acquired by the uninterrupted and undisputed possession of it for a certain time.

USUFRUCT: the most important of personal servitudes, servitude being the term for the right to use the property of another, whether real or personal. It may be established in any property which is capable of being used so far as is compatible with the substance of the thing not being destroyed or injured. This right may either be exercised directly, or may be leased or sold. The one possessing it is termed the usufructuary. The usufructuary is bound not to impair the property, and must furnish security for the restoration of it. A *quasi-usufruct* is recognized in the case of certain perishable things, or 'consumptibles.' In such case the equivalent in kind and quantity, or in value, is held to represent the things destroyed or impaired by use. There are works on the subject by Genty (1859) and Hanausek (1879).

USUMACINTA RIVER, Central America: formed by the junction of three head streams, the Chixoy, Pasion, and Lacantum, rising in Guatemala, for some distance in its middle course constitutes the frontier line between Guatemala and Mexico. It flows northwestward through the states of Chiapas and Tabasco, Mexico, and joins the Tabasco near its mouth, after a course of about 400 m. A navigable branch also flows eastward into the Laguna Terminos, opening into the Gulf of Campeachy.

USURER, USURIOUS, etc. See under USURY.

USURP, v. *ū-zėrp'* [F. *usurper*—from L. *usurpārĕ*, to seize to one's own use—from *usus*, use; *rapĭō*, I seize: It. *usurpare*]: to seize and hold by force and without right; to assume improperly; to arrogate; to appropriate. USURP'ING, imp. USURPED, pp. *-zėrpt'*. USURP'ER, n. *-ėr*, one who occupies the power or property of another without right. USURPATION, n. *ū'zėr-pā'shŭn* [F.—L.]: seizure and possession without right—applied particularly to the taking possession of a throne or sovereignty. USURPATORY, a. *ū-zėrp'ă-tėr-ĭ*, marked by usurpation. USURP'INGLY, ad. *-lĭ*.

USURY, n. *ū'zhû-rĭ* [F. *usure*, usury—from L. *usūră*, use, interest, usury—from *usus*, pp. of *utor*, I use: It. *usura*]: an illegal or very exorbitant rate of interest for money lent; the practice of taking exorbitant interest for money lent (see INTEREST); in *OE.*, interest. U'SURER, n. *ū-zhėr-ėr*, one who lends money at an illegal rate of interest; one who charges an exorbitant rate of interest; in *OE.*, a money-lender. USURIOUS, a. *ū-zhô'rĭ-ŭs*, taking an exorbitant rate of interest for money. USU'RIOUSLY, ad. *-lĭ*. USU'RIOUSNESS, n. *-nĕs*, the state or quality of being usurious. USURING, a. *ū'zhû-rĭng*, in *OE.*, of or pertaining to money-lending.

UT, n. *ŭt:* among the *French*, the first note of the musical scale, called by other nations *do*.

UTAH.

UTAH, *ū'tâ:* state; one of the United States of America; 45th in order of admission into the Union, 32d under the federal constitution; created a state from the terr. of U., and admitted 1896, Jan. 4; named from the Utah or Ute tribe of Indians (see UTES).

Location and Area.—U. is in lat. 37°—42° n., long. 109°—114° w.; bounded n. by Ida. and Wyo., n.e. by Wyo., e. by Colo., s. by Ariz., w. by Nev.; extreme length 345 m., extreme breadth 275 m., water surface 2,780 sq. m., land surface 82,190; total 84,970 sq. m. (54,380,800 acres); greatest elevation 13,500 ft. above sea-level (Mt. Tohkwano and Hayden Peak); cap. Salt Lake City.

Topography.—The whole state possesses large physical interest. It is divided into two parts by the Wahsatch Mountains, which cross it from n.e. to s.w., the w. part belonging to the Great Basin, with no river outlet to the ocean, and the e. part to the Rio Colorado drainage area. The most striking physical features are the Wahsatch Mts. and the High Plateaus, forming a central zone 9,000—11,000 ft. above sea-level; the Uintah Mts., stretching e. from about the middle of the Wahsatch, a table-land with peaks 12,000—13,500 ft. high; the Tavaputs Table-land, extending from the s. extremity of the Wahsatch e.s.e. beyond the boundary of the state; the Uintah White basin, between the Uintah Mts. and the Tavaputs Table-land, with ample drainage on the e. and w.; the Cañon lands s. of the Tavaputs Table-land and e. and s. of the High Plateaus, where the Green and the Grand rivers unite to form the Rio Colorado, and where there are numerous deep and picturesque cañons, nearly all traversed by streams of considerable size; and the Great Basin, subdivided into the Sevier Lake basin and the Great Salt Lake basin, a region of low valleys w. of the lofty zone, interrupted by spurs of a mountain system extending through Nev. and into Ida. and Or. The region of the Great Basin abounds in lakes, of which the chief are Great Salt Lake, 100 m. long, 50 m. wide, 1,900 sq. m. area, whose waters contain about 22 per cent. of pure salt, and are wholly destitute of fish; Utah Lake, 45 m. s., 130 sq. m., whose waters are fresh and pure; and Sevier, Little Salt, Preuss, and Fish lakes, all further s., and without apparent outlets. Great Salt Lake receives the Bear, Weber, and Jordan rivers, each having several tributaries, and is connected by the Jordan with Utah Lake, which also receives a number of large tributaries from the Wahsatch Mountains, including the Provo, American Fork, Spanish Fork, and Hobble, Payson, and Salt creeks. As far as known the lakes receive all the rivers in the Great Basin region. In the e. part the drainage is chiefly by the Rio Colorado and its tributaries, notably by the San Rafael, Uintah, Dirty Devil, White, Green, Grand, and San Juan rivers. The Great Basin drainage area is about three-fifths and the Rio Colorado area about two-fifths of the whole area; the former is

divided into the Great Salt Lake district of 837,660 acres of irrigable land, and the Sevier Lake district of 101,700 acres, and the latter into the Uintah White basin of 280,320 acres and the Cañon lands of 213,440 acres.

Climate.—The mean annual temperature ranges from 48°·65 in the n. to 51°·51 in the s., and 38°—40° e. of the Wahsatch Mountains, and 46°—52° w. The inhabited parts range in altitude 4,300—6,300 ft., but 70 per cent. of the population is settled in valleys scarcely exceeding 4,500 ft., and 60 per cent. in the valleys of Great Salt Lake and Utah Lake, where the air is dry, clear, and pure. The average rainfall is 16 in., excepting in the Great Salt Lake region, where it is 20 in., and rain is most abundant in the valleys Oct.—Apr., the remainder of the year being dry and hot. Spring opens in May, winter generally early in November.

Geology.—Clarence King pronounces the greater part of the rock of the interior mountain area to be a series of conformable stratified beds reaching from the early Azoic to the late Jurassic times. The raising of these beds produced the Sierras, the Wahsatch, and the parallel ranges in the Great Basin. Afterward the Pacific Ocean on the w. and the ocean that filled the Mississippi basin on the e., created a system of cretaceous and tertiary strata. It is observed that all the structural features of the local geology are nearly parallel with the meridian; hence the precious metals are found arranged in parallel longitudinal zones. Maj. Powell believes that the present Great Basin was the first part of the w. to emerge from the sea, that during the whole of the Mesozoic period the basin was drained into a sea which covered the Wahsatch, the Uintahs, and the High Plateaus, and that the Great Plains and the Great Basin were raised to their present altitude at the beginning of the Cenozoic period, where the uplifting of the continent between St. Louis and San Francisco began. For details concerning the physical and geological features of the terr., see the publications of the U. S. Geological Survey. The economic properties are gold, silver, lead, and copper, mined chiefly in Beaver, Juab, Summit, Salt Lake, Tooele, and Washington cos.; coal on both sides of the Wahsatch and the High Plateaus for almost the entire length of the terr., with principal mines in Emery and Summit cos.; brimstone near Cove Creek; antimony along the Sevier river; asphalt and oil with asphalt base (similar to that in Trinidad) on Green river; gilsonite or uintahite, yielding 99 per cent. of asphalt with the oil dried out, on the lower Duchesne and the lower White rivers; rock salt on Salt Creek and common salt on Great Salt Lake; and iron ore in various parts, but particularly in Iron co. The principal forest growths are fir, spruce, pine, cedar, maple, oak, mountain mahogany, and quaking ash.

Mining.—Some attempt at mining was made about

Area in Square Miles, 84,970. Population, 207,905.
Number of Counties, 27. Capital of State, Salt Lake City.
UTAH
SCALE OF MILES
0 25 50 75
IDAHO
WYOMING
ARIZONA
NEVADA
COLORADO
GREAT SALT LAKE DESERT
GREAT SALT LAKE
UINTA MOUNTAINS
UINTA IND. RES.
UNCOMPAHGRE IND. RES.
NAVAJO IND. RES.
SALT LAKE CITY
Ogden
Provo
Logan
Brigham
Kaysville
Farmington
Bountiful
Coalville
Murray
Mill Cr.
Park City
Heber
Grantsville
Tooele
Mercur
Spanish Fork
Springville
Payson
Eureka
Salem
Nephi
Fairview
Moroni
Ephraim
Mt. Pleasant
Spring City
Manti
Salina
Richfield
Fillmore
Monroe
Beaver
Cedar City
Parowan
St. George
Price
Castlegate
Helper
Green River
Moab
Monticello
Blanding
Bluff
Montpelier
Malad City
Preston
Bear L.
Rock Springs
Evanston
Almy
Lake Pt. Lookout
Great Salt Lake
Utah L.
Sevier L.
Fish Lake Forest Res.
Lees Ferry
Circle Cliffs
Escalante
Colorado R.
Green R.
San Juan
Grand
Price R.
Duchesne R.
Strawberry Cr.
Provo R.
Sevier R.
Virgin R.
Muddy Cr.
Fremont R.
Escalante R.
Kanab
Johnson
Rockville
Virgin
Mt. Carmel
Pahreah
Escalante
Boulder
Torrey
Thurber
Loa
Fremont
Burrville
Kingston
Circleville
Minersville
Adamsville
Beaver Junction
Milford
Frisco
Cove Creek
Kimberly
Joseph
Richfield
Aurora
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Longitude West
from Greenwich
BORMAY ENGRAVING CO., N.Y.

1865, but the lack of facilities for transportation retarded this industry. In 1869 the Union Pacific and the Central Pacific railroads united their tracks on the summit of Promontory Range, and the event gave such an impetus to mining that between 1871-87, silver, lead, and copper were produced to a total value of $123,998,848.98. At present the annual output of copper in the state is over 20,000,000 lbs., of refined lead about 50,000 lbs., of coal about 1,500,000 short tons, of gold about 12,000,000 fine oz., of silver about 10,000,000 fine oz., of gypsum about 3,000 tons, of salt nearly 500,000 barrels, and of mineral waters about 60,000 gals. Building stone produced in the state, chiefly made up of sandstone and lime stone are worth approximately $150,000 a year, and clay products about $300,000.

Agriculture.—There are nearly 30,000 farms in the state, comprising approximately 7,000,000 acres, of which over one-third is improved land. The total value of all farm property, including lands, buildings and improvements, implements and machinery, and live stock, is more than $100,000,000. The principal crops are corn, wheat, oats, rye, barley, potatoes, and hay. The wool clip is valuable.

Manufactures.—There are over 1,500 manufactories in the state, whose aggregate annual products are valued at about $30,000,000. The principal industries are flour and grist mill products; printing and publishing; confectionery; malt liquors; clothing, blacksmithing and wheelwrighting; slaughtering and meat packing; lumber and planing mill products; woollen goods; foundry and machine shop products.

Transportation.—U. has a total steam railroad trackage of over 1,500 miles, divided among many important roads, besides about 100 miles of electric and steam street railways.

Finance and Banking.—The total assessed valuation of property is about $150,000,000, the tax rate $5 per $1,000, and the bonded debt about $800,000. There are about 15 national banks, about 25 state banks, about 15 private banks and a few loan and trust companies. Salt Lake City does a good sized clearing house business.

Education.—U. annually spends over $2,500,000 in the maintenance of its public schools, in which there are well over 100,000 pupils enrolled, with about 2,500 teachers. There are several denominational and private academies and primary schools, and a state agricultural and mechanical college. In the Utah School for the Deaf at Salt Lake City instruction is given in carpentry, joinery, shoemaking, printing, and sewing. The principal institution within the state is, without the slightest doubt, the University of Utah, a splendidly equipped institution for higher education, located at Salt Lake City. This was originally incorporated in 1850 as the University of the State of the Deseret.

Religion.—The strongest denominations in the state

are the Latter Day Saints, who have an overwhelming majority, the Roman Catholics, the Methodist Episcopalians, and the Presbyterians. The Roman Catholic Church has the diocese of Salt Lake City, and the Protestant Episcopal Church has created the missionary district of Nevada and U., with a bishop for the latter resident at Salt Lake City.

Libraries.—There are over 15 libraries in U., of over 1,000 volumes, the majority being school or college libraries.

History.—U. was settled by the Mormons under Brigham Young (q.v.) 1847; was ceded by Mexico to the United States 1848; was organized as a terr. 1850, and was admitted into the Union 1896, Jan. 4. The Mormons named the place Deseret, signifying 'the land of the honey-bee,' and Young was the provisional as well the first terr. gov. They also constructed more than 100 m. of the Union Pacific railroad, and nearly all of the Utah Central, Utah Northern, and Utah Western roads. The history of U. from 1847 to 1890 is comprised in that of the Mormons (q.v.).

Government.—The constitution, ratified by popular vote 1895, Nov. 5, provides that the right of conscience shall never be infringed; that no public money or property shall be appropriated for the support of any ecclesiastical establishment; that the right of trial by jury shall remain inviolate; that no law shall be passed granting irrevocably any franchise, privilege, or immunity; and that all laws of a general nature shall have uniform operation. Perfect toleration of religious sentiment is guaranteed, and polygamous or plural marriages are forever prohibited. Art. IV. declares that both male and female citizens of the state shall enjoy equally all civil, political, and religious rights and privileges, and that every citizen of the United States of the age of 21 years and upward, who shall have been a citizen for 90 days, and shall have resided in the state or territory one year, in the co. 4 months, and in the precinct 60 days prior to an election, shall be entitled to vote thereat, excepting idiots, insane persons, and unpardoned persons convicted of treason or crime against the elective franchise. The legislative power is vested in a senate and house of representatives with biennial sessions, senators to be elected for 4 years, and representatives for 2 years, and all to be at least 25 years old. Till otherwise provided the senate will consist of 18 members and the house of representatives of 45; but the senators shall never exceed 30 in number, and the representatives shall never be less than twice nor greater than three times the number of senators. The executive department consists of a gov. (salary till otherwise provided $2,000 per annum); sec. of state ($2,000); state auditor ($1,500); state treas. ($1,000); atty.gen. ($1,500); and supt. of public instruction ($1,500), all elected for terms of 4 years. Candidates for the offices of gov. and sec. of state must be at least 30 years of age, and for that of atty.gen., at least 25 years. The gov. is vested with authority to veto objectionable features of a

bill while approving other portions, and in case of his death, impeachment, removal from office, or inability to perform the duties of his office, they devolve upon the secretary of state till the disability ceases or the vacancy is filled by regular election. The governor, justices of the supreme court, and attorney general constitute a board of pardons; the government, state treasurer, and state auditor, a board of insane asylum commissioners; and the governor, attorney general, and superintendent of public instruction, a board of reform school commissioners. The judicial power is vested in the senate sitting as a court of impeachment, in a supreme court of 3 judges (till 1905, when the number may be increased to 5), in district courts (7 till otherwise provided), in justices of the peace, and such other inferior courts as may be established by law. Judges of the supreme court are elected by the electors of the state at large for terms of 6 years, and the one having the shortest term to serve becomes the chief justice; and judges of the district courts are elected by the electors of their respective districts for terms of 4 years. The constitution locates the public institutions of the state, and confirms to each the lands granted to it by the United States in the act of congress 1894, July 16, as follows: the seat of government and the state fair at Salt Lake City; state prison in the county of Salt Lake; institutions for the deaf and dumb and the blind and the State Reform School at Ogden; and the state insane asylum at Provo City.

The state started on its course with a full republican administration. The successive governors, with their terms of service, are as follows:

The successive governors, with their terms of service, are as follows:

Territorial.

Brigham Young	1850-54	George L. Woods	1870-73
Edwin J. Steptoe	1854-57	Samuel B. Axtel	1873-75
Alfred Cummings	1857-61	George W. Emery	1875-80
Stephen S. Harding	1861-64	Eli H. Murray	1880-86
James D. Doty	1864-65	Caleb W. West	1886-90
Charles Durkee	1865-69	Arthur L. Thomas	1890-93
J. Wilson Shaffer	1870-71	Caleb W. West	1893-96

State.

Heber M. Welles	1886-1905	William Spry	1909-
John C. Cutter	1905-1909		

Population.—(1860) 40,273; (1870) 86,786; (1880) 143,963; (1890) 207,905; (1900) 276,749; (1910) 373,351.

UTAH LAKE: body of fresh water in Utah co., Utah, 4,300 ft. above sea-level; area about 130 sq.m. Its waters are discharged at its n. end through the river Jordan (45 m. long) into Great Salt Lake. Utah lake abounds in fish. Its tributaries are Corn creek, Hobble creek, American fork, Spanish fork, and Provo river. It has on the e. the Wahsatch mountains, and on the w. the Oguirrh range, the Lake Mountains, and the Tintic Mountains.

UTAH, AGRICULTURAL COLLEGE OF: the state agricultural and mechanical college, founded in accordance with

the land grant act of 1862; located at Logan, Utah. The college is a part of the public school system, and is open to both men and women. It was chartered in 1888, and opened to students in 1890; in 1901 the curriculum was considerably enlarged, and an extra year's work required for entrance to the collegiate courses leading to a degree. In 1903 the college organization was made more complete and effective by the establishment of five schools—the School of Agriculture, the School of Domestic Science and Arts, the School of Engineering and Mechanic Arts, the School of Commerce, and the School of General Science; in 1904 a Department of Music was added offering courses in vocal music, pianoforte, violin, and theory of music. The courses offered by the various schools of the college was as follows: (1) four years' courses in agriculture, domestic science, commerce, civil and mechanical engineering, and general science, leading to the degree of B.S. in agriculture, etc.; (2) three years' courses of high school grade in agriculture, domestic science, and commerce; (3) manual training courses in domestic arts (three years), and in mechanic arts (four years); (4) a college preparatory course; (5) a sub-preparatory course. The work of the last two years of the collegiate courses in agriculture, domestic science, and commerce is partially elective; the last three years of the general science course are wholly elective, except that students in the latter course are required to take two years' work in one language, and a certain amount of work in English biology, and history and civics. There are also short winter courses in agriculture (four weeks), in domestic arts (12 weeks) and mechanic arts (12 weeks). The state experiment station is connected with the college, and offers opportunity for advanced work. The students maintain an athletic association, two general literary clubs, and four special organizations open to the members of certain departments of instruction. The college buildings include the main building, mechanic arts building, the conservatory, the experiment station, the veterinary laboratory, the poultry building and four barns. The library contains 15,920 volumes; the students number 882.

UTAH, UNIVERSITY OF: the state university located at Salt Lake City. It was incorporated as the University of the State of Deseret in 1850, and opened to students in that year. But as it failed to secure patronage or adequate financial support, it was closed after one session until 1867. The governing board of regents, however, maintained their organization during this time, and had general supervision of the public school system. When first reopened in 1867 it was largely a commercial college, but in 1869 was reorganized with normal and classical departments. In 1894 a new charter was obtained, the name was changed to University of Utah, and a 60-acre tract of land on the Fort Douglas Reservation was granted to the university by the federal government. In

the same year the Salt Lake Literary and Scientific Association gave $60,000 for the endowment of the chair of geology. In 1899 the legislature provided for the erection of new buildings and the removal of the university to the new site, which was first occupied in 1900. The board of regents consists of the president of the university, member *ex officio,* and eight members appointed by the governor for four years. The university is open to both sexes on equal terms. The organization includes the School of Arts and Sciences, the State School of Mines, the State Normal School, and the Preparatory School. The School of Arts and Sciences offers two courses leading to the degrees of A.B. and B.S., respectively; these courses are both largely elective, the electives to be chosen from depending on the degree to be conferred. The School of Mines offers courses in mining and electrical engineering, leading to the degree of B.S. The courses in the State Normal School are: (1) Advanced Normal Course, four years, including electives in the School of Arts and Sciences, and leading to a degree and normal diploma; (2) a four years' normal course, graduates receiving the state certificate; (3) a four years' kindergarten course; (4) a five years' kindergarten-normal course. Instruction for teachers of manual training is included in the curriculum. There is a summer school, courses being provided in the usual subjects of the college curriculum and in pedagogy; work in the summer school may be counted toward a degree. The campus is situated at the base of the Wasatch Mountains, overlooking the valley, Great Salt Lake, and Salt Lake City; the buildings in 1904 include the library and administration building, the normal building, the engineering and physical science building, the museum, and the shops building. The library is the largest in the state, containing 28,275 volumes. The students number 755 and the faculty 60.

U'TAHS (Indians). See UTES.

UTAS. See UTIS.

UTENSIL, n. *ū-tĕn'sĭl* [L. *utensĭlĭs,* that may be used, fit for use—from *utor,* I use]: that which is used; an instrument or vessel in domestic use, and the like.

UTERINE, a. *ū'tėr-ĭn* [F. *utérin*—from L. *utĕrīnus,* uterine—from *utĕrus,* the womb: It. *utero:* akin to Skr. *udara,* the belly]: of or pertaining to the uterus, or proceeding from it; born of the same mother but by a different father. U'TERUS, n. *-ŭs,* the muscular and vascular part in the females of mammals, in which conception occurs, and in which the fetus is developed and nourished until birth; the Womb (q.v.). UTERITIS, n. *ū'tėr-ī'tĭs,* inflammation of the womb; more correctly, *Metritis.* UTERO-GESTATION, *ū'tėr-ō-,* the period of pregnancy.

UTES, *ūts,* or UTAHS, *ū'tâz:* subdivision of the Shoshone family of American aboriginals. They lead a nomad life—hunting and fishing, and having no agricul-

ture; besides the result of the chase and fishing, their subsistence is on berries, roots and other spontaneous products of the earth. They lead a roaming life or live on reservations in Utah (1,711), California (1,000), and New Mexico (number not determinable). Some of their kinsmen, the *Pah-Utes*, are on reservations in Nevada (596); the *Pi-Utes*, also of Shoshone stock, are in Nevada on reservations (227), in Oregon 80. Aboriginals of these tribes not on reservations are not separately enumerated in the 12th U. S. census reports as far as published.

UTGARD, n. *ôt'gârd* [Icel., out-yard]: in *Scand. myth.*, a region at the uttermost borders of the habitable world, the abode of giants and monsters; hell.

UTICA, *ū'tĭ-ka:* city, capital of Oneida co., N. Y.; on the Mohawk river, at junction of the Chenango and Erie canals; and on the Delaware, Lackawanna & Western, the New York Central & Hudson River, the New York, Ontario & Western, the Rome, Watertown & Ogdensburg, and the West Shore railroads; 52 m. e. of Syracuse, 95 m. w.n.w. of Albany; 10 sq.m. Utica is in an extensive dairying and floricultural region. The manufacture of cheese is an important industry. Other leading industries include: cotton, woolen, and knitted goods, yarns, agricultural implements, clothing, stoves and heaters, lumber, hot-air furnaces, hosiery, steam fitting and heating apparatus, marble products, paving material, foundry products, tobacco products, and malted liquors.

The principal shipments from Utica are farm products, fruit, dairy products and live-stock. In 1900 the Federal census reported 733 manufacturing establishments with $20,000,000 capital and 10,759 persons employed. In 1900 Utica stood 8th among the industrial cities of the state. The principal public buildings are: the government building, state armory, city hall, Y. M. C. A. building, Y. W. C. A. building, and public library. There are many churches in Utica, every leading denomination being represented. There are also several important charitable institutions, including the Utica State Hospital and the Masonic Home. There are several high schools, and numerous banks. The city is well administered and has more asphalt paving than any other city of its size. It connects, by means of electric trolley lines, with all suburbs. Utica is a well known transfer point for passenger traffic to the Adirondacks and Thousand Islands. The city is pleasantly situated on the s. bank of the Mohawk river on a site nearly level and about 400 ft. above the sea. The site of the city was included in a grant made by George II. 1734. Fort Schuyler was erected on the s. bank of the Mohawk river at the fording place 1758; several log-cabins were built in the vicinity 1788, and a store and road-house 1790; the place was incorporated as a village 1798; and a city charter was granted 1832. Pop. (1901) 56,383; (1910) 74,419.

UTICA: North Africa; an ancient city 27 m. n.w. of Carthage; originally founded as a Phœnician colony in 1101 B.C. During the third Punic war Utica submitted to Rome, and became the capital of the province of Africa. Afterward it was the see of a bishop, till its destruction by the Arabs. Its ruins include an amphitheatre, an aqueduct, and the remains of quays, formerly connected with the sea, now nearly 10 m. distant, by the ancient river Bagradas, the course of which has since diverted to the e.

UTICA SLATE: a black more or less carbonaceous and silicious clay slate (*Carbonaceous argillutyte*) prominently developed in the Mohawk valley of New York state, and deriving its name from the outcrops in the vicinity of Utica, N. Y. It is also recognized in the Champlain valley, and in the northern Appalachian region, but beyond these localities their beds are represented by more calcareous or silicious shales and arenytes. These shales rest upon the Trenton limestone and are succeeded by the more arenaceous Lorraine beds. The chief fossils of the Utica slates are the trilobite *Triarthus beckii,* and graptolites of the genus Diplograptus.

UTILITARIANISM: in Ethics, the theory of the Highest Good or Supreme End of conduct, that makes the greatest happiness of the greatest number, or the greatest happiness on the whole, the criterion of right and the substance of moral goodness. The word 'Utility' was used in this sense by Jeremy Bentham; the form 'Utilitarianism' by John Stuart Mill.

The doctrine of Utilitarianism is opposed to all those theories that refer us to some internal sense, feeling, or sentiment, for the test of right and wrong; a test usually described by such phrases as a Moral Sense, and Innate Moral Distinctions (see ETHICS); therefore Utility is sometimes termed the *external* or objective standard of morality. It is opposed also to the view that founds moral distinctions on the mere arbitrary will of God.

The Utilitarian theory has been maintained in ancient and in modern times, though with considerable variation, not merely in the mode of stating it, but in important peculiarities. Thus, in ancient times it was held by Epicurus, but in a purely self-regarding form; each person's end was his own pleasure or happiness exclusively, the happiness of others being instrumental and subordinate. The modern phase of the theory may be said to begin with Hume. He strenuously maintained, what must be regarded as the essential feature of the Utilitarian doctrine, that no conduct is to be deemed worthy of moral approbation unless, in some way or other, it promotes human happiness; and that actions ought to be visited with disapprobation exactly according as they have the opposite tendency.

Jeremy Bentham is, more than any other person, identified with the theory of 'Utility,' which was in his hands

not merely the foundation of Ethics, but also the basis and justification of political and legal reforms. Having in view the state necessity of sacrificing smaller interests to greater, or, at all events, of not sacrificing greater interests to smaller, he described the ethical end as 'the greatest happiness of the greatest number.' He illustrated the doctrine by setting it in opposition to *asceticism*, which he interpreted to mean that pleasure is forfeited, and pain incurred, without yielding a compensating amount of good, either to the agent or to other persons.

Paley advocated a form of Utilitarianism: he made the will of the Deity, enforced by future rewards and punishments, the impelling motive to duty; but in determining what that will was, in particular cases, he included a reference to the present beneficial tendency of actions.

James Mill maintained substantially the views of Bentham. Sir James Mackintosh, while differing in some points from Bentham and from Mill, in the main adhered to Utility as the ultimate standard of right. John Austin, in his *Province of Jurisprudence Determined*, contributed a lucid exposition and a powerful defense of the principle. John Stuart Mill devoted a separate work to the subject. Samuel Bailey, in *Letters on the Human Mind*, III., discussed the ethical problem fully, and pronounced on the Utilitarian side. Herbert Spencer ranks among the upholders of Utilitarianism; likewise Bain, in his edition of Paley (Chambers's series) and in *The Emotions and the Will*.

Before stating the arguments for and against the principle of Utility as the basis of morals, it is proper to inquire what sort of proof an ethical system is susceptible of. Ethics is a practical science (see SCIENCES), and, as such, involves an end; having the peculiarity of being the final or comprehensive end of all human conduct (see TELEOLOGY). Now, in the speculative or theoretical sciences, *ultimate* principles cannot be proved; it is the nature of proof to rest one doctrine on some other doctrine, so that we must come at last to what is taken without proof: we cannot prove our present sensations, nor can we demonstrate that what has been will be; we must take these things for granted. And so it is with ultimate ends in the practical sciences. The final end sought in all conduct cannot be deduced from any more ultimate premise; it must be gathered from the actual conduct of men; we must find by observation what ends men actually pursue, or what ends they recognize that they ought to pursue, and, if we can, generalize them into one comprehensive statement. Thus it is that the supporters of Utilitarianism aver that men, even though refusing the theory, still proceed on it in their conduct; and that the doctrine cannot be impugned consistently with the admitted motives of human action. Human beings, it is asserted, as a rule, have no other end in life but happiness, either for themselves or for others; and

morality belies human nature if it does not accord with this universal object of pursuit.

One of the confirmations of Utilitarianism which is often appealed to is derived from the usual inducements to right conduct common to all moralists. We find that no one can preach morality without making use of its bearings on happiness. The very meaning of the terms expressive of the highest virtues—love, goodness, mercy, compassion, fidelity, honesty, integrity, justice—is something that relieves the pains and augments the pleasures of sentient beings. To love is to make the object happier, and love is the fulfilling of the law. This argument states an undeniable truth; but in the form thus given it seems to show that happiness depends on doing right—not the form of statement special to Utilitarianism, which is that doing right depends on happiness.

Although Utilitarians hold that good and evil, right and wrong, are properly determined by a calculation of the consequences as regards human happiness, they do not all maintain that past or existing systems of morals have been on all points framed on this principle. Bentham and James Mill appear to have thought that the rule has always been kept in view, though often badly applied. But others, equally earnest in regarding it as the only legitimate rule, are of opinion that, in the past and existing ethical precepts, men have been guided partly by Utility, partly by Sentiment—i.e., liking or disliking for the act itself, irrespective of any further consequences. In the ceremonial rites of ablution, so widely prevalent, there is a certain show of Utility, mingled with the fancy of cleanliness or purity. In the doctrine of the sacredness of kings there is a combination of Utility and Sentiment.

The following are the chief objections to Utilitarianism, with the arguments in reply:

1. It is maintained that Happiness is not, either in fact or in right, the sole aim of human pursuit; that men actually, deliberately, and by conscientious preference, seek other ends. Thus, virtue is an end in itself, to be sought whether it yield happiness or not, and even though it were productive of the greatest misery. The qualification, however, is frequently added, that virtue, in the long run, without intending it, and all the more for not intending it, is the unfailing source of happiness.

To which the supporter of Utilitarianism answers:

1. It is quite true that men seek other ends than immediate happiness to themselves and to others, and that, in particular, they cultivate the virtues as ends in themselves, without always thinking of them as means to happiness. But this is by the operation of a familiar law of the mind, whereby what was originally of the nature of means comes at length to be valued as an end; such is the well-known case of the love of money. The virtues of justice and veracity are essential to human society, just as money represents the basis of subsistence; and,

by frequent association, the regard that we pay to the end is transferred at last to the means.

2. It may be shown in many ways that the great social virtues derive their worth in our estimation from their subservience to human happiness, and not by any absolute title of their own. Take, first, Veracity or Truth, which, of all the moral duties, has most the appearance of being an absolute and independent requirement. A little consideration will show that even this is not in our eyes an unlimited or unqualified virtue. Men have always approved of deception practiced toward an enemy in war, to a madman, or a highway robber; also, secrecy or concealment, even though misinterpreted by others, is generally allowed—unless it leads to some pernicious results; while if the divulgence of the truth were attended with harm, it would be generally reprobated. But an absolute standard of truth is incompatible even with secrecy or disguise; in departing from the course of perfect openness, or absolute publicity of thought and action, in every possible circumstance we renounce ideal truth in favor of a compromised, qualified veracity—a following of truth only so far as is expedient.

Again, as regards Justice, the presence of considerations of Utility is equally obvious. There is no absolute rule of justice that does not bend to circumstances. If justice be defined giving every one his own, or what he is entitled to, there is the show of an absolute rule; but, in reality, nothing is determined. The meaning is, to give to each what *law* and *custom* have declared to be a man's own. It is declared just for an elder son to receive a larger share of the parental estate than all the rest of the children put together; but it is clear that whatever justice there is in this must be founded on some ground of expediency. (See, on this subject, J. S. Mill's *Utilitarianism*, chap. v.)

II. It is further objected to the adoption of Utility as the standard of Right that the full consequences of actions are too numerous, involved, and complicated to be reduced to calculation; and that, even where the calculation is possible, people have seldom time to make it.

To this it is answered, first, that the primary moral duties refer to conduct that can be fully calculated to the satisfaction of any reasoning mind. Thus, to revert to the two leading examples, Truth and Justice: the habitual disregard of these duties would soon bring a society to utter confusion and ruin; without them there could be no social co-operation; man would fall below the condition of the gregarious animals; the race could hardly be saved from extirpation. On the other hand, the observance of these duties in a high degree raises to a corresponding degree the means of human happiness. The balance of advantages is all on one side—there is no case for the other side at all.

There have always been moral rules or enactments where the calculation of consequences was much less easy

—e.g., the indissolubility of marriage is maintained in some countries, and not in others; and there have been considerable differences as to the forbidden degrees of affinity in marriage. In these usages there are both advantages and disadvantages, and the preponderance is variously estimated by different calculators. In such cases the Utilitarian would say: Do not make a compulsory enactment restricting liberty, which restriction is an evil in itself, unless the balance of advantages is unquestionable and great.

As to the argument that it is impossible to make the calculation of consequences at every time of our performing a moral act, the reply is, this is unnecessary; the calculations as to the various duties have been already made, and are embodied in rules, which rules we remember and apply without thinking of the process through which they are reached. The navigator at sea does not need to compute the *Nautical Almanac* every time he determines his longitude; he carries it to sea with him ready for use.

III. A third objection to Utilitarianism is, that men in all ages have distinguished between the Right, on one hand, and the Expedient, i.e., the Useful, on the other: the two are in most languages put in opposition or contrast. The reply is, that the Expedient, when thus opposed to the Right, commonly means what seems expedient for the agent at the time, but is not expedient for people generally, or even for himself in the long run. It is sometimes expedient, in this sense, to tell a lie, to rob, or to murder; but such actions are not expedient in the sense of general utility or the greatest happiness of mankind, nor in the sense of the greatest happiness of the individual.

It is further to be remarked, in this contrast of the Expedient and the Right, that the Expedient may mean simply an addition to our conveniences or comforts, something that it is well for us to have, but that we might do without. Thus, it is highly expedient to possess cheap postage, railways, and electric telegraphs. On the other hand, the Right points to the essentials of our existence; without the fulfilment of contracts, respect to life and property, obedience to law, society would be dissolved.

IV. There are, however, several more fundamental objections to Utilitarianism. In the first place, its arguments as to what ends men actually do seek rest upon a confusion between pleasure and happiness. Happiness is a very vague and wide-ranging term. While, doubtless, it involves pleasure, it involves much more. As commonly used, it is equivalent to Well-Being or Welfare (Aristotle's *Eudaimonia*). Now, Welfare includes, besides pleasurable feeling, the active exercise of one's higher capacities, suitable work, etc. And, even when the exercise of one's powers, e.g., of intellectual insight, is accompanied with pain, it is generally recognized that such activities are better than crass ignorance or sloth.

J. S. Mill himself says, 'Better a man dissatisfied than a pig satisfied.' But this is the admission of distinctions of *quality* or intrinsic *worth* in pleasures. Higher pleasures are those of higher functions, and human functions are judged to be higher or lower with reference to some other standard than simple feeling; in short, with reference to a rational standard.

In the second place, Utilitarianism rests on a confusion in regard to 'desire' and the 'desirable,' and on a mistaken psychology of volition. It does not follow that, because the satisfaction of desire brings pleasure, pleasure *per se* is the sole or even chief object of desire. It may give me pleasure to read a work on metaphysics, but what I desired primarily was to master its doctrines. Pleasure is, as Aristotle said, like the bloom on the fruit. It is the outcome of normal functioning. Man is endowed with a variety of impulses, appetites, tendencies, that seek satisfaction, at first instinctively and unconsciously. In the process of satisfying these tendencies, man becomes conscious at once of their pleasure-pain values and of their further results. After he has become conscious of the relation between an impulse and the pleasure of satisfaction a man can make the latter the prime object of his will; but what is normally willed is just the satisfaction of the impulse. That this is not the same as pleasure is proved by the case of the drunkard who, while he recognizes that more pain than pleasure will ensue from his indulgence, yet cannot restrain the impulse to drink. The fundamental fact in volition is that man can consciously and purposely seek the satisfaction of a complex variety of impulses and cravings, and these satisfactions are accompanied each by its own characteristic feeling. If there is a general formula for the Highest Good of man it must be something like the following: the maximum harmonious satisfaction, in a graded or hierarchal series, of the various impulses and capacities of human nature, regarded as both sentient and intellectual, individual and social.

Thirdly, if one grant that each man does seek always his own pleasure, then Utilitarianism is unable to give any cogent reason for passing from this proposition to the proposition that each ought to endeavor to promote the pleasure or happiness of all. J. S. Mill's argument on this point, to wit: that if for each the pleasure of each is desirable, then for all the pleasure of all is desirable, commits the fallacy of assuming that what the individual regards as good for himself in his private capacity he will feel obliged to promote in other persons at the expense of his own pleasure. From its premises Utilitarianism is unable to explain the sense of an obligation to sacrifice one's private interests for the sake of family or country, truth or justice. Utilitarianism really begs the question by smuggling the 'ought' into its expression 'the desirable.' What is actually desired is by

no means always identical with what should be desired, i.e., with the intrinsically Good.

Notwithtsanding these inconsistencies, Utilitarianism has done good practical service in insisting that, in framing laws and in making moral judgments, men should take account of the happiness of their fellows. The element of truth in it, as an ethical theory, is that pleasurable feeling is a constituent of the Highest Good of man. See also HEDONISM.

UTILITY, n. *ū-tĭl'ĭ-tĭ* [F. *utilité*—from L. *utilĭtas* or *utilĭtātem*, utility, benefit—from *utilis*, useful—from *utor*, I use: F. and It. *utile*, useful]: usefulness; profitableness; benefit; advantage; profit. UTILIZE, v. *ū'tĭl-īz*, to render profitable; to turn to good account or use. U'TILIZING, imp. *-ī-zĭng*. U'TILIZED, pp. *-īzd*. U'TILIZA'TION, n. *-ĭ-zā'shŭn*, the act of turning to account or of making profitable. U'TILITA'RIAN, a. *-ĭ-tā'rĭ-ăn*, pertaining to utility or things useful; considering utility rather than beauty; regarding usefulness only; pertaining to utilitarianism: N. one who holds the doctrine of utilitarianism. U'TILITA'RIANISM, n. *-ĭzm*, the doctrine which makes utility the sole standard of good for man, or of moral conduct; the doctrine that 'the greatest happiness of the greatest number' should be the end and aim of society in its social and political institutions.—SYN. of 'utility': service; use; avail; usefulness; advantageousness; convenience.

UTIS, n. *ū'tĭs*, or UTAS, n. *ū'tăs* [F. *huit*, eight—from L. *octo*, eight]: in *OE.*, the octave; the eighth day, or the space of eight days, after a saint's day; a saint's day or festival.

UTLATE'CAS. See QUICHES.

UTMOST, a. *ŭt'mōst* [AS. *utemest*—from *ut*, out; *mæst*, most]: at the furthest point or extremity; most distant; last; extreme, of the greatest or highest degree: N. the most that can be; the greatest power, degree, or effort.

UTOPIA, *ū-tō'pĭ-a* [Gr. *ou*, not; *topos*, place—therefore literally 'nowhere']: the imaginary island which Sir Thomas More (q.v.) makes the scene of his famous political romance, *De Iptimo Reipublicæ Statu, deque Nova Insula Utopia*, pub. in Lat.., Louvain 1516, transl. into Eng. by Bishop Burnet. This island, which More represents as discovered by a companion of Amerigo Vespucci, is the abode of a happy society, which, in virtue of its wise organization and legislation, is free from the harassing cares, inordinate desires, and customary miseries of mankind. More's romance obtained wide popularity, and the epithet *Utopian* has since been applied to visionary or impracticable schemes for improvement of society.

UTOPIAN, a. *ū-tō'pĭ-ăn* [from More's *Utopia* (lit., *no place*), an imaginary land which he represents as en-

joying the utmost perfection in its laws and institutions, etc.—coined from Gr. *ou,* not; *topos,* a place]: pertaining to any state of ideal perfection; fanciful; chimerical; impracticable: N. one who is enthusiastic in the advocacy of impracticable schemes. UTO'PIANISM, n. *-ĭzm,* the tendencies of a utopian; chimerical schemes in theory or practice.

UTRAQUIST, n. *ū'tra-kwĭst* [from L. *utraquistæ*—from *utrâque* (sc., *specie* in both kinds)]: one who believes that communicants should partake of both the cup and the bread: applied first in the 14th c. to all those members of the Western Church, principally followers of John Huss (q.v.), who contended for administration of the Eucharist to the laity in both kinds; but in later times restricted to one particular section of the Hussites, the Calixtines (q.v.), though all Hussites claimed this as a fundamental principle of their church discipline. The name may be said to date from 1415, when the followers of John Huss in Prague and elsewhere in Bohemia adopted 'the communion of the cup' as their rallying cry, and emblazoned the cup on their standards as the distinguishing badge of the association. In 1417 the University of Prague, by a formal decision, directed that the laity should communicate in both kinds; the result being that the Council of Constance prohibited students from resorting to Prague for study. The Hussite party, on the contrary, made the demand one of the four points on which they insisted as the condition of their submission to the church. It was rejected by the Council of Constance; but the Council of Basel, 1433, acceded to it on the condition that, whenever communion was administered with the cup to the laity, the ministering priest should accompany the ministration with a declaration that Christ was contained whole and entire under each species. A portion of the Hussite party was content with the explanation of this and the other points offered by the council, but the more strenuous held out: see HUSS, JOHN. Those who yielded were called Utraquists. During the Reformation troubles this division was still maintained. The Utraquists were favorably regarded by the imperial party; and after the battle of Mühlberg, 1547, they alone were formally tolerated in Bohemia and Moravia. One of the most celebrated leaders was Jacobus v. Mies.

UTRECHT, *ū'trĕkt,* Dut. *ütrĕcht:* prov. of the Netherlands; bounded w. by S. Holland, n. by N. Holland and the Zuider Zee, e. by Gelderland, s. by the Rhine and Leck; 42 m. long from e. to w., and 21 wide from n. to s.; 346,405 acres, of which 62,500 are arable, 180,000 under grass, 39,000 in wood.

The country is varied by beautiful hilly districts, level fields, orchards, tilled land, meadows, and moss. The hilly tract is well wooded, and stretches from near Amersfórt to Rhenen on the Rhine, 21 m. Rye, oats, and

buckwheat are grown; sheep, cattle, and bees extensively kept. South of this belt is rich clay land, producing excellent wheat and barley. Near Amersfórt and Rhenen tobacco is largely planted.

Utrecht is watered by the Rhine, Vecht, Leck, Amstel, Grebbe, and many other rivers. Many herrings, eels, flounders, anchovies, etc., are taken in the Zuider Zee. Besides agriculture, the industries are soap-boiling, sawing wood, copper and iron founding, making machinery, carpets, tiles, bricks, coarse pottery, cement, etc. There are many beautiful country-seats, the climate being dry and healthful.

The chief places are Utrecht (q.v.), Amersfórt (q.v.), Rhenen, Wijk bij Duurstede, Montfórt, and Ijsselstein (pronounced *ī'sĕl-stīn*).—Pop. (1901) 259,834.

U'TRECHT (*Ultrajectum* or *Trajectum ad Rhenum*): town of Holland, cap. of the prov. of Utrecht; 24 m. s.e. of Amsterdam, beautifully situated in a district abounding in sand-hills, woody heaths, rich grassy meadows, extensive orchards, flower-gardens, and cultivated fields. The old walls were levelled 1830, planted with trees, and formed into beautiful and well kept promenades; but Utrecht is now surrounded with strong forts, and is strategically important as covering Amsterdam.

Utrecht is favorably situated for trade, being the point from which several railways radiate: it is traversed by two canals, and has excellent water-communication by the Old Rhine and the Vecht. The staples are grain, cattle, and various manufactures. It is the residence of many noble families, the seat of a university, national veterinary school, national hospital, high military court, etc. Principal buildings are the cathedral or Domkerk, the town-house, the mint, the university, and several handsome barracks for the infantry and cavalry, especially the Willemskazerne. The cathedral was consecrated to St. Martin about 720. In 1674 a hurricane destroyed the body of the building between the choir and the tower, so that the latter (321 ft. high) is now isolated. The University of Utrecht, founded 1636, has 41 professors and about 600 students. It has a fine library of 150,000 vols., museum of nat. history, botanic garden, and observatory. There is a national school for military surgeons; a grammar school; normal school; musical college; historical, meteorological, medical, pharmaceutical, and other societies. Since 1723 Utrecht has been the headquarters of the Jansenist Church (q.v.).

The charitable institutions are numerous. Principal industries are: manufacturing tobacco and cigars; woolen fabrics and carpets; ultramarine and bone-black; salt; furniture; baskets; tin, copper, and silver work; sawing wood; rope-making; iron-founding; book-printing; etc. The royal cigar factory alone makes 40,000 cigars daily.

Utrecht is one of the oldest cities of the Netherlands,

founded (probably) by the Romans. Here the famed union of the northern provinces for defense of political and religious freedom was formed 1579, Jan. 23. For a short time in 1807, Louis Napoleon, King of Holland, resided in Utrecht. It has been the birthplace of many distinguished men, among others Pope Adrian VI. 1459. —Utrecht has acquired celebrity for the number of treaties signed there in bringing to an end the war of the Spanish Succession: see UTRECHT, PEACE OF: SUCCESSION WARS.—Pop. (1901) 106,800.

U'TRECHT, PEACE OF: the peace concluded at Utrecht (q.v.) 1713, Apr. 11, bringing to an end the war of the Spanish Succession (see SUCCESSION WARS). Preliminaries between France and Great Britain had been signed in London 1711, Oct. 8. A peace-congress was opened at Utrecht 1712, Jan. 12; but the preposterous demands of Austria forced the French to break off the conferences, in the hope of making a separate peace with Britain and compelling the other allies to lower their pretensions. This plan was successful: agreement on all points at issue was established between France and Great Britain 1712, Aug.; and soon afterward agreements were made with Holland, Portugal, Prussia, and Savoy. As each of the contracting parties negotiated in its own name, nine distinct treaties of peace were signed 1713, Apr. 11. By the treaty between France and Great Britain, France ceded St. Kitt's, Hudson's Bay, Nova Scotia, and Newfoundland (liberty of fishing for cod being reserved), formally recognized the reigning dynasty and the Hanoverian succession agreed to demolish the fortifications of Dunkirk, engaged that the crowns of France and Spain should never be united, and that no part of the Spanish Netherlands should ever be ceded or transferred to France. Spain renounced her Italian possessions in favor of Austria, and gave up Gibraltar and Minorca to Great Britain, with which power also she concluded the Assiento (q.v.) treaty. The chief of the special agreements with the other contracting parties were as follows: Ypres, Knocke, etc., to be exchanged with Holland for Douai, Bouchain, etc., and a treaty of commerce to be concluded; both banks of the Amazon to belong to Portugal, Spanish Gelders and the dist. of Kessel to be ceded to Prussia, and its ruler's title of king, assumed 1701, formally recognized—Prussia in turn resigning all claims to the principality of Orange; the Duke of Savoy to obtain Sicily, with title of king, etc. The treaty of Utrecht did not make peace with Austria and the German empire; but in the following year, at Rastadt (1714, Mar. 17) and Baden (1714, Sep. 18), they agreed to substantially the same terms as were offered at Utrecht. The electors of Cologne and Bavaria, who had been put under the ban of the empire, were restored; Sardinia, granted to Bavaria at Utrecht, was restored to Austria; Austria renounced her claims to the Spanish succession; the ces-

sion of the Spanish possessions in Italy was confirmed; Breisach and Freiburg, in the Breisgau, were given to Austria; the highest ridge of the Maritime Alps was made the boundary between France and Savoy; and on failure of the Spanish Bourbons, the crown of Spain was to fall to the House of Savoy.

UTRERA, *ô-trā'râ:* old town of Spain, province of Seville, 18 m. by railway s.e. of Seville. In early times it was flourishing and populous; and in recent years it has begun to revive. It is important as a military post; contains a beautiful Gothic church, a Moorish castle, and cavalry barracks. The streets and promenades are kept clean and fresh by streams of running water. The inhabitants are mostly agriculturists engaged on the productive estates which surround the town. Grain, wine, oil, and fruit are produced. Sheep and cattle are reared in the vicinity. Pop. 15,093.

UTRICLE, n. *ū'trĭ-kl* [L. *utricŭlus,* a small skin or leathern bottle—from *uter,* a bag or bottle made of an animal's hide]: in *bot.,* a thin-walled cell; a bladder-like covering; a thin-skinned one-seeded fruit. UTRICULAR, a. *ū-trĭk'ū-lėr,* containing vessels like small bags. UTRIC'ULATE, a. *-lāt,* utricular. UTRIC'ULUS, n. *-lŭs,* a kind of fruit with an inflated covering; a little bladder filled with air, attached to certain aquatic plants.

UTRICULA'RIA. See BLADDERWORT.

UTTER, a. *ŭt'tėr* [AS. *ut,* out; *utor,* outer, extreme]: complete; perfect; total; absolute; thorough; entire; in *OE.,* situated on the outside or remote from the center; outer: V. to send *out,* as words; to speak; to disclose; to publish; to put into circulation, as base coin; to dispose of. UT'TERING, imp. UT'TERED, pp. *-tėrd.* UT'TERABLE, a. *-ă-bl,* that may be uttered; that may be spoken or expressed in words. UT'TERANCE, n. *-ăns,* manner of speaking; pronunciation; a putting into circulation, as base coin. UT'TERER, n. *-ėr,* one who utters; a promulgator. UT'TERLY, ad. *-lĭ,* to the full extent; perfectly; totally. UT'TERMOST, a. *-mōst,* extreme; in the furthest or highest degree: N. the greatest power or degree; that beyond which nothing is. UTTER BARRISTER, one admitted but not yet allowed to plead within the bar. TO THE UTTERMOST, in the highest degree.—SYN. of 'utter, v.': to deliver; give forth; discharge; pronounce; liberate; discover; sell; vend; declare; express;—of 'utter, a.': extreme; excessive; utmost; peremptory; perfect; mere.

UTTERANCE. See under UTTER.

UTTERANCE, n. *ŭt'tėr-ăns* [F. *outrance,* excess—from *outre,* beyond—from L. *ultra,* beyond]: in *OE.,* extremity; terms of extreme hostility.

UTTOXETER, *ŭt-tŏks'ė-tėr,* locally, *ŭks'ė-tėr:* market-town of Staffordshire, England: on an eminence above the vale of the Dove, 16 m. n.e. of Stafford. A church

with an ancient tower and lofty spire is noteworthy. There are two large breweries. Pop. about 4,000.

UVALDE: Texas; town, county-seat of Uvalde co.; on the Southern Pacific railroad; about 95 m. w. by s. of San Antonio. It is in an agricultural and stock-raising region, and in the vicinity are asphaltum mines. The chief industrial establishments are lumber mills, a flour mill, and a machine shop. There are seven churches, separate public schools for white and colored pupils. The two banks have a combined capital of $83,000, and the national bank has deposits amounting to $100,000. Pop. (1890) 1,265; (1900) 1,889; (1910 est.) 2,000.

UVAR'OVITE: a rare and beautiful emerald-green variety of garnet, distinguished by its containing chromium. It has a hardness of 7.5 and a specific gravity varying from 3.41 to 3.52. It is usually found in limestone or associated with chromite. Its most celebrated localities are the Ural Mountains and Orford, Quebec, where it occurs in groups of small dodecahedral crystals.

UVEA, n. *ū'vē-ă* [L. *uva*, a grape]: in *anat.*, the posterior layer of the iris, so called from the black pigment which covers it, and which resembles the skin of a black grape. U'VEOUS, a. *-ŭs*, resembling a grape; of or pertaining to the uvea. U'VIC, a. *-vĭk*, of or from the grape.

UVULA, n. *ū'vū-lă* [L. *uva*, a grape: It. *uvola*]: in *anat.*, the fleshy conical body suspended from the middle of the lower border of the soft palate (q.v.). U'VULAR, a. *-lėr*, of or pertaining to the uvula.

UXBRIDGE: Canada; a town of West Ontario co., Ontario, on the Black river, and on the Toronto & Northern railway, 43 m. n.e. of Toronto. It has lumber and flour mills, and manufactures iron ware, mill machinery, engines, agricultural implements, woolens, etc. Pop. (1901) 1,657.

UXBRIDGE: Mass.; town in Worcester co.; on the Blackstone river, and on the New York, New Haven & Hartford railroad, about 19 m. s.e. of Worcester. Uxbridge was formerly a part of the town of Mendon; in 1727 it was separated and incorporated under its present name. In 1772 the northern part of the town was set off and incorporated as Northbridge. The town includes the villages of Calumet, Hecla, Rivulet, Scott's, Wheelock's, Uxbridge, North Uxbridge, and Uxbridge Centre. The chief industrial establishments are cotton and woolen mills, machine shops, a furniture factory, and creameries. There are five churches, a high school, 17 district schools, a free public library. The national bank has a capital of $100,000, and the national and savings banks have combined deposits amounting to $640,860. Pop. (1890) 3,408; (1900) 3,599; (1910) 4,671.

UXMAL, *ôz'mâl*, Mexico: an ancient Maya city now in ruins, in the n.w. of Yucatan, about 60 m. s.w. of Merida. It has vast remains of ancient grandeur, tem-

ples, cyclopean terraces, etc., extending over a large area. The principal ruins are the *Casa del Gobernador* and the *Casa de las Monjas.* The temples are said to have been used by the Indians as late as the 17th c.

UXORIOUS, a. *ŭg-zō′rĭ-ŭs* [L. *uxōrius,* of or pertaining to a wife—from *uxor,* a wife]: foolishly fond of a wife. Uxo′riously, ad. *-lĭ.* Uxo′riousness, n. *-nĕs,* excessive and foolish fondness for a wife. Uxor′icide, n. *-ŏr′ĭ-sīd* [L. *cædo,* I kill]: one who murders his wife; the murder of a wife by her husband.

UYÜK. See Euyuk.

UZ: Syria; a historical region mentioned in the Old Testament as the scene of the story of Job, and lying to the e. or s.e. of Palestine, probably in Hauran, the exact position not having been identified.

UZANNE, Louis Octave: French writer on bibliography and miscellaneous subjects: b. Auxerre, 1852, Sept. 14. He founded (1880) *Le Livre,* succeeded (1890) by *Le Livre Moderne.* In 1889 he founded the Société des Bibliophiles Contemporains. Among his works are *The Caprices of a Book-Lover* (1877); *Her Highness, Woman* (1884); *Our Friends, Books: Talks on Curious Literature* (1886); *Modern Bindings; Physiology of the Quays of Paris* (1890); *The Bachelor's Prayer-Book* (1890).

UZBEKS, *ŭz′bĕks:* important branch of the Turkish family of Tartars, constituting the chief element in the native population in Khiva, Bokhara, and Khokand (Ferghana). Some are still nomads, but most are settled in towns. See Usbegs.

UZZIAH: king of Judah (792-740 b.c.). He is described in the Book of Kings as being a successful warrior and wise ruler, but was stricken with leprosy because he persisted against the high priest in offering incense in the Temple. Consult: Smith, *Prophets of Israel.*

V

V, v. *vē:* 22d letter (and 17th consonant) of the English alphabet; *u* and *v* were formerly used indiscriminately the one for the other, but now *u* is used only as a vowel, and *v* only as a consonant. The name of the letter is from the Phœnician and Hebrew *vau* (signifying a nail, which the original form of the letter resembled), which stood sixth in the alphabet, and became the Digamma (q.v.) of the Old Greek, and the *f* of the Latin (see F). The Greek *υ* (see ALPHABET), from which the Lat. *v* is taken, had, in the classical period, degenerated into a sound like the French *u*, and in modern Greek is undistinguishable from *i*. The Greeks, after they had lost the digamma, represented Lat. *v* by **ου** or **β**; e.g., **Ουαρρων** or **Βαρρων**=Varro, **Βιργιλίος**=Virgillius. In the beginning of Latin words, *v* must have had a consonantal sound approaching that of *v* in English, as is inferred from its persistence as compared with the Greek digamma; e.g., Vinum = (F)**οἶνος**, Vesta =**Ἑστία**. Between two vowels, on the contrary, it was often dropped out, as in *nuper* for *novumper, Jupiter* for *Jovipiter, prudens* for *providens;* from which we may conclude that it had in that position the power of a semivowel, like Eng. *w*. In New High German, *v* takes the place of Gothic and Eng. *f* (see F), and is pronounced like *f*, while the *v*-sound is expressed by *w*.—As a Roman numeral, V stands for 5, and with a dash over it ($\bar{V}$) for 5,000.—In *chem.*, it is the symbol for *Vanadium*.—As an abbreviation, v. stands for *verb* or *verse;* and in legal papers for *versus*, 'against.'

VAAL, *vâl*, RIVER: important branch of the Gariep (q.v.) or Orange river, s. Africa. It receives its name (signifying 'Yellow') from the color of its waters when in flood. It rises in the Drakenberg range, at the n.w. angle of Natal, and after a very circuitous course of about 450 m., partly through the S. African Republic (q.v.), but mainly along its s. frontier, joins the other great branch, the Nu Gariep or Orange river, in lat. 29° 10′ s., long. 24° 28′ e.

VACANT, a. *vā'kănt* [F. *vacant*—from L. *vacans* or *vacan'tem*, empty; *vacārĕ*, to be empty: It. *vacante*]: empty; void of every substance except air; not filled by an occupant or possessor; unsupplied; idle; free; indicating want of thought, as a face; inane. VA'CANTLY, ad. *-lĭ*. VA'CANCE, n. *-kăns*, in *Scot.*, vacation. VA'CANCY, n.

-kăn-sĭ, that which is vacant, empty space; time of leisure; situation or office unfilled; the time during which a place or situation remains unfilled; the state of being unfilled; listlessness; emptiness of thought. VACATE, v. *vă-kāt'* [L. *vacātus*, pp. of *vacārĕ*, to be empty, to be without]: to make empty; to withdraw from; to annul. VACA'TING, imp. VACA'TED, pp. VACA'TION, n. *-shŭn* [F. —L.]: act of vacating or making void; the intermission of judicial proceedings; the period during which court does not sit; recess (the 'long vacation' in Eng. courts is Aug. 10—Oct. 24); interruption for a time of regular studies at a college or school; intermission of any stated employment.—SYN. of 'vacancy': vacuity; chasm; relaxation; intermission;—of 'vacant': devoid; free; unencumbered; uncrowded; unfilled; disengaged; thoughtless.

VACCINA'TION: process by which a specific disease, termed *Vaccinia* or cow-pox is introduced into the human organism for protection against a far more severe disorder—smallpox. For the history of the remarkable discovery of vaccination—'that masterpiece of medicinal induction'—see the life of Jenner. In his *Inquiry into the Causes and Effects of the Variolæ Vaccinæ* (1798), he establishes the following facts: (1) That this disease (cow-pox) casually communicated to man has the power of rendering him unsusceptible of smallpox; (2) that the specific cow-pox alone, and not other eruptions affecting the cow, which might be confounded with it, has this protective power; (3) that the cow-pox might be communicated at will from the cow to man by the hand of the surgeon, whenever the requisite opportunity existed; (4) that the cow-pox once ingrafted on the human subject, might be continued from individual to individual by successive transmissions, conferring on each the same immunity from smallpox as was received by the one first infected from the cow.

The *method of vaccinating* and the *phenomena of cow-pox*, as observed in the human subject after vaccination, claim our first and chief attention. Except under circumstances of special risk (e.g., where smallpox is in the neighborhood), children should be vaccinated only when in apparently good health. Diarrhea and skin-diseases are especially to be avoided; and it is important to see that there is no chafing behind the ears, or in the folds of the neck or groin. Vaccination should be in very early infancy, if health permits; healthy children in large towns, when a month or six weeks old; more delicate children, at the age of two or three months; and all except those whose health positively contraindicates vaccination, by the age of three months.

The lymph used was in former times taken from the vesicles of a vaccinated child, about a week after the operation, but now this virus is obtained from heifers (the so-called 'animal lymph' as distinguished from 'human lymph'). The process of vaccination consists essentially in introducing the lymph into the structure of

the true skin, or in bringing it in contact with the absorbing surface. This may be effected in various ways, the one most commonly employed in former times, and even yet occasionally, being by puncture. The operation is extremely simple. The skin on the outside of the arm, below the shoulder (sometimes in adults on the leg, above the knee), should be held on the stretch, and a very sharp, clean lancet, well charged with lymph, should be made to puncture the skin from above downward, at an angle of about 45°, and be made just to enter the true skin: the matter thus inserted is retained by the valvular character of the puncture and the elasticity of the skin. In this form of the operation, not less than five or six such punctures should be made, half an inch from one another; or, for greater certainty, three punctures may be made on each arm. If the lymph is preserved on 'points,' each point should be inserted into the punctures made by an ordinary lancet. Some surgeons make a number of minute superficial punctures over a patch of the size of a silver half-dime, and spread the lymph over this spot with the flat part of the lancet: this kind of tattooing should be repeated on three spots. Others make a number of parallel scratches, or crossed scratches, with a charged lancet; and others use special scarifiers or rakes, consisting of three or four needle points inserted in an ivory handle, and drawn either once or twice at right angles over the tense skin, the lymph being then plastered over the scarified surface. A far better plan of preserving lymph than that of drying it on points is that of preserving it in a fluid state in closed capillary tubes, in which form it is ready for use without any preparation. When the operation is successfully performed, the skin at the spot becomes slightly elevated, hard, and red, on the 3d or 4th day; on the 5th or 6th day, a vesicle of bluish-white color forms, with elevated edge and a depressed cup. It is distended with clear lymph, and attains its perfection on the 8th day; and then, or on the 9th day, the vesicle is surrounded by an inflamed ring or areola; on the 9th, 10th, and 11th days, the vesicle becomes a pustule, the cupped form disappears, the areola enlarges till it becomes a circle, with diameter of one to three inches. On the 12th, 13th, and 14th days, the pustule dries up; and in the course of the next week the scab separates and falls off, seldom remaining till the 25th day. It leaves a cicatrix, which usually is permanent in after-life, circular, somewhat depressed, dotted or indented with minute pits, and in some instances radiated. The establishment of the areola is accompanied with constitutional disturbances, as indicated by restlessness and heat of skin, frequent derangement of the stomach and bowels, and occasional swelling of the glands of the arm-pit. These symptoms are seldom severe, but seldom quite absent. Occasionally the course of the above symptoms is modified, as when they are simply retarded, or simply accelerated, or altogether

irregular and spurious; and it should be carefully borne in mind that a vaccination presenting any deviation from the perfect character of the vesicle and the regular development of the areola is not to be relied on as protective against smallpox. As a general rule, neither the local nor the constitutional symptoms of ordinary vaccination require any treatment.

Investigations conducted several years ago by order of the British government, whose scope included an examination of the arms of nearly half a million children, showed that vaccination is often so imperfectly performed as to leave no mark and to exert no protective power. In general, with observance of all precautions, primary vaccination should not fail of success in more than one case out of 150 to 200 cases. Observations by Drs. Buchanan and Seaton in 1863, on more than 50,000 children in national and parochial schools, work-houses, etc., in London, showed that, of every 1,000 children without any mark of vaccination, 360 had scars of smallpox; while of every 1,000 children who had evidence of vaccination, only 1.78 per 1,000 had any such traces; and with regard to the quality and amount of the vaccination, it was found that, of children having four or more cicatrices, only 0.62 per thousand had any trace of smallpox; while of those who had a single mark, 19 per 1,000 were scarred by smallpox. Hence the best vaccination was more than 30 times as protective as the worst, and the worst was more than 47 times better than none at all. Records of more than 15,000 cases at the Smallpox Hospital in London showed that, while the unvaccinated died from smallpox at the rate of 37 per cent, the vaccinated died at the rate of only 6½ per cent; the mortality among those with four or more scars being only 0.55, while that among those with only a single scar was 7.73 per cent. It is to be noted, further, that the protective power of vaccination shows itself in two ways—(1) in shielding the constitution, in the great majority of cases, from any kind of attack of smallpox; (2) in the exceptional occurrence of smallpox in those vaccinated, in so modifying the disease as almost invariably to deprive it of danger to life, or of the disfigurement frequently left by the unmodified disease.

With regard to *revaccination,* its utility and necessity are abundantly demonstrated by experience. This operation should be performed with the same care and pains as primary vaccination; and it should not be left to periods when smallpox is epidemic, but should be performed on all persons after puberty—this being the more necessary on account of uncertainty as to the perfect success of the primary operation. During an epidemic of smallpox, even young children, if the marks of the primary vaccination are at all imperfect, should decidedly be revaccinated. In revaccinating, it must always be remembered that the local results of revaccination give no information whatever as to the constitutional condi-

tion in which the revaccinated person was with regard to the liability to contract smallpox.

Much has been written regarding the *dangers of vaccination;* and a well-known case, in which an infant thus communicated syphilis to a whole population in a remote district of Piedmont, and some deaths from (as was alleged) vaccination with impure lymph, have directed attention to the subject. The use of animal lymph has obviated the danger of any such occurrence now.

The relations between smallpox in man and cow-pox in the cow claim a passing remark. Jenner believed that the two diseases were essentially the same, and various experiments in inoculating healthy cows with smallpox virus have established their identity almost beyond doubt. The disease known as 'grease' appears to be the same as the smallpox in man and the cow-pox in cows; and the lymph from this horse-pox has been successfully used for vaccination.

VACCINE, a. *văk'sĭn,* [F. *vaccin,* vaccine matter—from L. *vaccīnus,* of or from cows—from *vacca,* a cow: It. *vaccino*]: pertaining to or derived from cows, as *vaccine* matter: N. the virus of cow-pox used in vaccination; 'lymph.' VAC'CINATE, v. *-sĭ-nāt,* to inoculate with vaccine matter or the cow-pox, as a preventive of smallpox. VAC'CINATING, imp. VAC'CINATED, pp. VAC'CINATOR, n. *-nā-tėr,* one who vaccinates. VAC'CINA'TION, n. *-nā'shŭn,* the act or practice of inoculating persons with the cow-pox in order to secure them from attacks of the smallpox. VACCINIA, n. *văk-sĭn'ĭ-ă,* an eruptive vesicular disease, originally of the cow, now introduced into the human system as a protection against smallpox. VACCIN'IFER, n. *-sĭn'-ĭ-fėr* [Eng. vaccine; L. *fero,* I bear]: one from whose body lymph is taken for the purpose of vaccination. VACCININ, n. *văk'sĭ-nĭn,* a fat which replaces others in butter. VACCINIC ACID, an acid found in butter.

VACCINIACEÆ, *văk-sĭn-ĭ-ā'sē-ē:* natural order of exogenous plants, differing from *Ericaceæ* chiefly in having an inferior ovary and succulent fruit. Many botanists make it a section of *Ericaceæ;* in Gray's Botany it is the sub-order *Vaccinieæ.* About 200 species are known, natives of temperate climates, in all parts of the world, chiefly in the n. hemisphere. A few species, remarkable as being parasitic, are natives of Peru. The vacciniaceæ are shrubs, and rarely small trees; with numerous round or angular branches, simple leaves on very short stalks, and flowers solitary or in racemes. Whortleberries (q.v.) and Cranberries are the most familiar examples of the order. The species are numerous in North America, the genus *Gaylussacia* being known as Huckleberry, and the genus *Vaccinium* (including Cranberry, Cowberry, Bilberry, etc.) having nearly 20 species and varieties in the n. and middle states e. of the Mississippi river.

VÂCH, [Skr., speech]: one of the names of Saraswati (q.v.), the female energy of the Hindu god Brahma.

VACHASPATI ['lord of speech,' from Skr. *vâch*, speech; *pati*, lord]: in Hindu mythology, a name of *Vr'i-haspati* (q.v.), the instructor of the gods.

VACILLATE, v. *văs'ĭl-lāt* [L. *vacillātus*, pp. of *vacillārĕ*, to sway to and fro: It. *vacillare;* F. *vaciller*]: to waver; to fluctuate in mind or opinion; to be unsteady or inconstant. VAC'ILLATING, imp.: ADJ. unsteady; inclined to fluctuate in opinions or resolutions; unstable; inconstant. VAC'ILLATED, pp. VAC'ILLATINGLY, ad. *-lĭ.* VAC'ILLA'TION, n. *-lā'shŭn* [F.—L.]: a moving one way and the other; unsteadiness; a fluctuation of mind. VAC'ILLANT, a. *-lănt* [F.—L.]: wavering; unsteady; fluctuating. VAC'ILLATORY, a. *-lă-tō-rĭ*, vacillating; unsteady; unreliable.

VACUIST, VACUITY. See under VACUUM.

VACUOLE, n. *văk'ū-ōl*, [L. *vacŭus*, empty]: in *bot.* and *animal histology*, clear space of indefinite size and arrangement in the protoplasm of a cell; in *zool.*, small cavity found in the interior of many of the Protozoa, caused by the presence of little particles of food. VAC'UOLA'TED, a. *-lā'tĕd*, full of vacuoles. VAC'UOLA'TION, n. *-lā'shŭn*, the process of developing vacuoles.

VACUUM, n. *văk'ū-ŭm*, [L. *vacūum*, an empty space; *vacŭus*, empty: It. *vacuo*, emptiness]: a space empty or devoid of matter solid or aeriform; the opposite of plenum. IN VACUO, *ĭn văk'ū-ō* [L.]: in empty space. VAC'UIST, n. *-ĭst*, one who regards a perfect vacuum in nature possible, as opposed to *plenist*, which see. VACUITY, n. *vă-kū'ĭ-tĭ* [F. *vacuité*—from L. *vacŭĭtas* or *vacŭĭtātem*]: space unfilled or unoccupied by matter; emptiness; void, inanity; thoughtlessness, as *vacuity* of countenance. VACUOUS, a. *văk'ū-ŭs*, empty. VAC'UOUSNESS, n. *-nĕs*, state of being empty. VACUUM-BRAKE, a continuous brake used on railways, in which a partial vacuum is produced in a continuous tube on the cars by means of a steam-jet on the locomotive. Connected with this tube are collapsing bellows which close when exhausted of the air in them, thus drawing the brake-rods (see BRAKE). VACUUM-PAN: see SUGAR—*Manufacture.* VACCUM-PUMP, a pump connected with the boiler of a marine engine which creates a vacuum, the water from the sea being thus forced into the boiler by the greater pressure of the atmosphere. TORRICELLIAN VACUUM. See TORRICELLI; EVANGELISTA; TORRICELLIAN.

VAC'UUM: empty space, or space wholly devoid of matter. From Aristotle to Descartes, metaphysical speculators took the question into their own hands, and wrote absurdities about it. Thus, Descartes says that, if a vessel be perfectly empty, its sides must be in contact—confounding the totally distinct ideas of *matter* and *space.* The dictum that *nature abhors a vacuum* was employed to account for the rise of water in pumps; but it was presently found that nature did not, in this case,

abhor a vacuum through more than an elevation of about 32 ft.: see TORRICELLI, EVANGELSTA. When the subject was taken up by its legitimate investigators, the experimental philosophers, such absurdities disappeared, but real difficulties were brought to light. So far as experiment has yet shown, it may be inferred that vacuum cannot exist. The interstellar spaces, though probably devoid of ponderable substance ordinarily known as matter, or at most only occasionally visited by it, are believed to be pervaded by the luminiferous medium: see ETHER; UNDULATORY THEORY. That this is Matter (q.v.), is inferred from the effects of its vibrations on the eye. It is not merely for providing a medium that seems indispensable for the passing of light and heat that the assumption seems unavoidable that the universe is a *plenum:* Newton expressly said (see FORCE, for the quotation at greater length) 'That gravity should be innate, inherent, and essential to matter, so that one body may act upon another at a distance through a *vacuum,* without the mediation of anything else, by and through which their action and force may be conveyed from one to another, is to me so great an absurdity that I believe no man who has in philosophical matters a competent faculty of thinking can ever fall into it.' This sweeping assertion is believed to be substantiated by modern observations of a connection between sun-spots, planetary configurations, and terrestrial magnetism, obviously requiring some material of mediation between the sun and its secondaries; also by Faraday's electrical discoveries.

But, in ordinary language, a vacuum is said to be produced (more or less *perfect*) when ordinary ponderable matter, such as air, is more or less completely removed from the interior of a closed vessel. Till the beginning of the 19th c., the most perfect vacuum that could be obtained was what is called the Torricellian vacuum—i.e., the space above the mercury in a carefully filled barometer tube. Such a vacuum, however, is almost useless for experimental purposes; moreover, it contains mercurial vapor.

A suggestion of Davy, recently reinvented and greatly improved by Andrews, gives the means of procuring a much more perfect vacuum. An ordinary air-pump removes all but about the $\frac{1}{120}$ of the gas in the receiver—i.e., produces a vacuum of about $\frac{1}{4}$ inch, as it is called. But if the gas employed be carbonic acid, admitted and pumped out several times, for riddance as far as possible of the last trace of air, the remaining gas will be almost wholly taken up by means of moistened caustic potash previously placed in the receiver. Concentrated sulphuric acid also should be present, to desiccate the potash when it has done its work. In this way Andrews easily obtained a vacuum of about $\frac{1}{4500}$ of an inch, which remained unchanged for a fortnight. Here all but $\frac{1}{135000}$ of the air had been removed. Further improve-

ments, devised by Frankland, Gassiott, and others, have been made in this process, especially for production of (so-called) vacuum-tubes for the study of electrical discharges; and the exhaustion has been sometimes carried so far that the attenuated matter remaining was unable to conduct the discharge of an induction-coil.

VADE, v. *vād* [the same word as *fade*]: in *OE.*, to fade; to vanish; to pass away. VA'DING, imp. VA'DED, pp.

VADE-MECUM, n. *vā'dē-mē'kŭm* [L. *vadĕ*, go; *mecum*, with me]: a book or other thing which a person caries with him as a constant companion; a pocket-companion or guide; a manual; a handbook.

VADIUM MORTUUM: literally, a dead pledge. A term used to denote the security given in the form of a mortgage by which the lender agrees that if the money borrowed is not repaid at the time specified the estate shall pass to the lender.

VADIUM VIVUM: literally, a live pledge. A term used to denote a pledge given in the form of a mortgage under which the lender agrees to take the sum borrowed out of the profits of the land.

VAGA, PERINO DEL; or more properly PIETRO BUONACCORSI: Italian painter; b. Florence 1500; d. Rome 1547. He was taught painting by a Florentine named Vaga (whence the name generally applied to him), by whom he was brought to the notice of Giulio Romano and other pupils of Raphael. The latter, then engaged upon his designs for the loggia of the Vatican, employed him to assist Giovanni da Udine in the arabesque work, and subsequently entrusted him with the execution of some of the principal frescoes. He thenceforth was a favorite pupil of Raphael, after whose death he rose into great reputation. Compelled to leave Rome in 1527, on the sack of the city, he went to Genoa, where he entered the service of the prince Doria and founded a school of painting. He returned to Rome during the pontificate of Paul III., by whom he was entrusted with many valuable commissions; and at the time of his death probably stood at the head of the Roman school. He designed after the style of Michelangelo, and by Vasari is placed in that respect next to the great Florentine master. His works are widely distributed over Italy, the best being the *Creation of Eve* in the church of Saint Marcello in Rome. He also frescoed the ceiling of the Sala Regia in the Vatican. His artistic activity extended to the designing of tapestry, baldacchini, and the execution of stucco work.

VAGABOND, a. *văg'ă-bŏnd* [F. *vagabond*, a vagabond—from L. *vagabundus*, strolling about—from *vagor*, I wander; *vagus*, wandering; It. *vagabondo*]: wandering; having no settled home or habitation; unsettled; idle: N. an idle fellow without a settled home; a wanderer; a vagrant; a scamp. VAG'ABONDAGE, n. *-bŏnd-āj* [F.], or

VAG'ABONDISM, n. *-ĭzm*, the idle unsettled life of a vagabond.

VAGANTES: (wanderers, vagabonds), a term applied in the Middle Ages to the wandering bands of scholars (*vagi scholares*), who, during the intellectual movement which pervaded Europe during the 12th and 13th centuries, formed a distinct and characteristic class in the population, and played an important part in the social life of the time. They were sometimes called *Bacchantes*—Brethren of Bacchus—from their drunken, roystering habits. They were renowned for their songs, full of life and movement, and often keenly satirizing the clergy and religious orders. These 'Carmina Burana' form a collection, a manuscript copy of which is still to be found in the Benedictine Abbey at Munich. The verses are in rhymed Latin, or written in macaroni style of German or French and Latin; some are German or French pure and simple. They deal with religious controversy, love, wine and sport; some are absolutely frivolous; others pious in tone. In France the *vagantes* were known as 'Goliardæ,' probably because they generally pursued their peregrinations under the leadership of men of gigantic stature (Goliath).

VAGARY, n. *vă-gā'rĭ*, VAGA'RIES, n. plu. *-rĭz* [L. *vagāri*, to wander, to roam: It. *vagare:* F. *vaguer*]: a wandering of the thoughts; a wild freak; a whimsical purpose; a capricious frolic. *Note.*—VAGARY is probably only an accommodation to the L. *vagāri* in spelling, the true origin being found in some such imitative word as Scot. *figmaleery* or *whigmaleery;* OE. *fegary*, a whim, a freak, crotchet: Ger. *larifari*, syllables without sense, nonsense.

VAGINA, n. *vă-jī'na*, [L. *vagīna*, a scabbard, a sheath: It. *vagina:* F. *vagin*]: a sheath; in *bot.*, the sheath formed by the basal part of certain leaves where they embrace the stem: in *anat.*, the canal or passage which leads from the vulva or external orific to the uterus; any part which completely surrounds another. VAGI'NAL, a. *-năl* or *văj'ĭ-năl*, pertaining to the vagina; resembling a sheath. VAGI'NANT, a. *-nănt*, serving to invest or sheathe. VAGI'NATE, a. *-nāt*, or VAGI'NATED, a. *-nā'tĕd*, furnished or invested as with a sheath. VAGI'NO-PENNOUS, a. *-nō-pĕn'nŭs* [L. *penna*, a wing or feather]: having the wings inclosed in a sheath; sheath-winged.

VAGINULA, n. *vă-jĭn'ū-lă*, or VAGINULE, n. *văj'ĭn-ūl* [L. *vagīnŭla*, a little sheath—from *vagīna*, a sheath]: in *bot.*, a sheath surrounding the basal portion of the archegonium in mosses.

VAGRANT, a. *vā'grănt* [Norm. F. *vagarant*—from L. *vagāri*, to wander: It. *vagare;* F. *vaguer*, to ramble]: wandering from place to place; roving; having no fixed habitation; unsettled: N. one who has no settled abode; an idle wanderer; a sturdy beggar; a vagabond; a tramp.

VA'GRANTLY, ad. *-lĭ*, in a vagrant manner. VA'GRANCY, n. *-grăn-sĭ*, unsettled condition; life or habits of one without a fixed habitation.—*Vagrants* or tramps are classed in Eng. law as (1) idle and disorderly persons, able, in whole or in part, to maintain themselves and their families, but who neglect to do so: (2) rogues and vagabonds, persons suspected of living by crime; (3) incorrigible rogues. Vagrants of the first class are liable to one month's imprisonment with hard labor; those of the second class to 3 months imprisonment and hard labor; while those of the third class are liable to be committed for trial at the sessions, to be kept to hard labor in the interim, and, after conviction, to be sentenced to one year's imprisonment and hard labor, with whipping in the case of males.

In most of the United States various enactments and ordinances of more or less severity have been made for suppression and punishment of vagrants and tramps; but such characters are still numerous. They often pretend to be going about in search of work; but though there are doubtless some unfortunate honest workmen among them (who, if they could be selected from the mass, should receive all possible consideration and aid in securing work), the great majority of tramps form a class who, from mental constitution, would almost rather die than work. It is hard to understand what inducements can lead them to prefer their wandering and shifty life. Apparently the freedom of it and the immunity from work are its chief attractions. They have been well described as wandering about 'ready for any crime, but not planning crimes; quite ready to rob, but very much afraid of large dogs; very courageous against unprotected women, but skulkers when a broad-shouldered laborer turns his eyes their way; with no purpose except wandering, no restraint except hunger, no hope except of getting drunk upon some lucky haul, nomads in the midst of civilization, simple savages without savage resources.' —See BEGGAR: POOR, THE—POOR LAWS.

VAGUE, a. *vāg* [F. *vague*, empty, vague—from L. *vagus*, strolling about, wandering: It. *vago*]: not settled or definite; loose; unfixed; ill-defined; proceeding from no reliable source, as a report; in *OE.*, wandering or unsettled. VAGUE'LY, ad. *-lĭ*. VAGUE'NESS, n. *-nĕs*, state of being uncertain or unsettled; looseness; indefiniteness.—SYN. of 'vague': unsettled; indefinite; ambiguous; undetermined; lax; flying; hazy; doubtful; uncertain.

VAGRANTS: See MENDICANCY.

VAIGACH, Russia: an island in the Arctic Ocean, belonging to the government of Archangel, separated from the mainland by the Yugor Strait and from Nova Zembla by Kara Strait, and forming with Nova Zembla the western boundary of the Kara Sea. The mountain chain of the adjacent mainland peninsula is continued in the island near the east coast. Area 1,410 sq.m.

VAIL, n. *vāl* [same as VEIL, (q.v.)]: that which hides or conceals; a curtain; a separating screen.

VAIL, v. *vāl* [a contr. of OE. *avale*, which see]: in *OE.*, to let fall; to cap to a superior; to express respect or submission by uncovering; to let fall in token of respect, as the sail of a ship at sea; to fall; to let sink in fear; to yield in token of respect. VAIL'ING, imp. VAILED, pp. *vāld.*

VAIL, ALFRED: American inventor: b. Morristown, N. J., 1807, Sept. 25; d. there 1859, Jan. 19. He was graduated at the University of the City of New York in 1836, and in 1837 became associated with S. F. B. Morse in his telegraphic experiments. His mechanical knowledge applied to the experimental apparatus resulted in the first practicable Morse machine. He invented the combination of the horizontal-lever motion to actuate the style; devised the alphabet of dots, spaces, and dashes which it necessitated; and in 1844 constructed the automatic lever and grooved roller which embossed on paper the characters he originated. He was appointed assistant superintendent of the telegraph line constructed between Baltimore and Washington in 1843, and on the completion of the system, in 1844, was stationed at Baltimore, where he invented the finger-key.

VAIL, CHARLES HENRY: American Universalist clergyman: b. Tully, N. Y., 1866, Apr. 28. He studied music in New York, and for a while was engaged in teaching it. He was graduated at Saint Lawrence University, Canton, N. Y., in 1892, and during the following year pursued his theological studies. In 1893-4 he was minister of All Souls' Church, Albany, N. Y., and from 1894 to 1901 of the First Universalist Church in Jersey City, N. J. In 1901 he was nominated governor of New Jersey by the socialist party, of which in 1901-2 he was national organizer. He has lectured in many parts of the country, and has published: *Modern Socialism* (1897); *National Ownership of Railways* (1897); *Scientific Socialism* (1899); *The Industrial Evolution* (1899); *Mission of the Working Class* (1900); *Socialism: What It Is and What It Is Not* (1900); *The Socialist Movement* (1901); *The Trust Question* (1901); and *Socialism and the Negro Problem* (1903).

VAIN, a. *vān* [F. *vain*—from L. *vānus*, vain, empty: Icel. *vanr*, vain, void: It. *vano:* comp. Gael. *faoin*, foolish, idle, empty]: proud of trifling attainments or petty things; having an unduly high opinion of one's own accomplishments; conceited; ineffectual; fruitless, as an effort; unsatisfying; false. VAINLY, ad. *-lĭ*, in a vain manner; foolishly; without effect; to no purpose; idly. VAIN'NESS, n. *-nēs*, vanity; fruitlessness. VAINGLO'RIOUS, a. proud or boastful to excess of one's own attainments or performances; self-proud. VAINGLO'RIOUSLY, ad. VAINGLO'RY, n. self-pride; excessive pride in one's own acts.

VANITY, n. *vān'ĭ-tĭ* [F. *vanité*—from L. *vanĭtas*, emptiness]: empty pride inspired by an overweening opinion of one's own importance; anything empty, visionary, or unsubstantial; vain pursuit; idle show; ostentatious arrogance; petty pride. IN VAIN, ad. to no purpose; ineffectually.—SYN. of 'vain': showy; ostentatious; idle; worthless; unimportant; empty; unreal; shadowy; light; inconstant; false; deceitful; delusive; trifling; useless;—of 'vanity': arrogance; presumption; self-conceit; pride; haughtiness; egotism; emptiness; worthlessness; ostentation.

VAIR, n. *vär* [F. *vair*, a kind of fur in heraldry—from L. *varĭus*, different, variegated: It. *vario*, various]: the skin of a species of squirrel, much used in the 14th c. as fur for garments; in *her.*, a series of small shields placed close together, alternately blue and silver, intended to represent the appearance of the skins when sewed edge to edge. VAIRÉ, a. *vā'rā*, or VAIRY, a. *vär'ĭ*, in *her.*, charged with vair: see HERALDRY.

VAIS'ESHIKA, *vī-sā shē-kâ:* one of the two great divisions of the *Nyâya* (q.v.) school of Hindu philosophy, probably a later development of the Nyâya itself, properly so called, with which it agrees in its analytical method of treating the subjects of human research, but from which it differs in arrangement of topics, and especially by its doctrine of atomic individualities or *vis'eshas*—whence its name is derived.

The topics or categories (*padârthas*) under which *Kan'âda*, founder of this system, arranges his subject-matter, are the following six: (1) substance, (2) quality, (3) action, (4) generality, (5) atomic individuality, and (6) co-inherence; and later writers of his school add a seventh category, non-existence. 1. Substance is the intimate cause of an aggregate effect; it is that in which qualities abide, and in which action takes place: it is ninefold—viz., earth, water, light, air, ether, time, space, soul, and *manas*, or the organ of affection. 2. Quality is united with substance: it comprises 24 terms, of which the following are specimens—color, odor, number, dimension, severalty, conjunction, priority, gravity, fluidity, sound, understanding, pleasure, pain, desire, volition, merit, demerit. 3. Action consists in motion, and abides in substance alone: it affects a single, that is, a finite substance, which is matter; and it is either motion upward or downward, or contraction or expansion, or motion onward. 4. Generality abides in substance, quality, and action: it is of two kinds—genus and species. 5. Atomic individuality resides in eternal substances, by which are meant the organ of affection, soul, time, space, ether, earth, water, light, and air: it is the ultimate difference, technically called *vis'esha;* such differences are endless; and two atoms of the same substance, though homogeneous with one another, differ merely so far as they exclude one another. 6. Co-inherence, or perpetual intimate connection, resides in things which cannot exist independently from one another, such as, the parts and the whole, quality and the thing qualified, action and agent, species

and individual, atomic individuality and eternal substance. 7. Non-existence, the last category, added by the modern Vais'eshikas, is defined by them as one of the following: non-existence which is without beginning, but has an end—as that of a jar, which did not exist until its antecedent non-existence ceased when being formed out of the clay; or non-existence which has a beginning, but no end—as that of a jar smashed by the blow of a mallet; or absolute non-existence, which, extending through all times, has neither beginning nor end—as when it is said that a jar is not on the ground; or mutual non-existence, which is the reciprocal negation of identity—as when it is remarked that a jar is not a piece of cloth. The nature of each of these substances, qualities, actions, etc., is then, the subject of special investigation.

According to the Vais'eshika system, understanding is the quality of *soul*, and the instruments of right notion are treated of under the head of 'understanding (*buddhi*).' Kan'âda admits of only two such instruments, or *pramân'as*—viz., knowledge which arises from the contact of a sense with its object, and inference. Comparison, revelation, and the other instruments of right notion mentioned in other systems, the commentators endeavor to show are included in these two.—See Eng. translations of portions of Kan'âda's works, by Dr. Ballantyne (Mirzapore 1851, and Calcutta 1848), and by Dr. Roer in *Bibliotheca Indica* (Calcutta 1850); also essays on the V. system by H. T. Colebrooke (*Miscellaneous Essays*, I. Lond. 1837), and Prof. M. Müller in vols. VI., VII., of the *Zeitschrift der deutschen morgenländischen Gesellschaft*.

VAISHN'AVAS, *vish'na-vaz:* one of the three great divisions of Hindu sects; see INDIA—*Religion*. The word, derived from *Vishn'u* (q.v.), designates the worshippers of this deity, and comprises a great variety of sects, and a variety differing in different periods of the mediæval history of India, so that old accounts no longer apply. The common link of all the sects comprised under the name V. is their belief in the supremacy of Vishn'u over the other gods of the Trimûrti (q.v.). The following are the principal sects of this division:

1. The *Râmânujas*, or *Srî Vaishn'avas*, or *Srî Sampradâyins*—who originated from *Râmânuja*, a reformer, born at Perumbur, in s. India, about the middle of the 12th c., and considered by his followers as an incarnation of *S'esha* (q.v.), the serpent of Vishn'u. This sect has various subdivisions. Their most striking peculiarity is the preparation and the scrupulous privacy of their meals; for should the meal during its preparation, or while they are eating, attract even the looks of a stranger, the operation is instantly stopped, and the viands buried in the ground. They distinguish themselves from other sects by perpendicular and transverse lines drawn with a white earth on their foreheads and other parts of their bodies; also they wear a necklace of holy wood and carry a rosary. Their principal religious tenet is that Vishn'u is the cause and creator of all worlds; that he and the universe are one.

though he is of a twofold form: the supreme spirit, or cause, and the gross one, the effect or matter. One of their distinctions from the Vedânta (q.v.) is that they regard their supreme deity as endowed with qualities.

2. The *Râmânandas*, or *Râmâvats*—by far the most numerous class of sectaries in Gangetic India. They belong chiefly to the poorer and inferior classes, except for their inclusion of the Rajputs and military Brahmans. The founder of this sect was *Râmânanda*, assigned to a date between the 13th and the 15th c., and who resided at Benares. The especial object of their worship is Vishn'u, in his incarnation as *Râmachandra*, and his consort *Sîtâ*. They are distinguished by their disregarding the distinction of caste among the religious orders. Their sectarian marks are like those of the Râmânujas.

3. The *Kabîr Panthis*—important sect, whose founder was Kabîr, one of the disciples of Râmânanda, above mentioned, and whose date therefore was probably about the end of the 14th c. According to the doctrine of this sect, there is but one God, creator of the world; but, in opposition to the Vedânta (q.v.), they assert that he has a body formed of the five elements of matter, and a mind endowed with the three *gun'as*, or qualities: he is of ineffable purity and irresistible power, eternal, and free from the defects of human nature, but in other respects does not differ from man; so that the pure man is his living resemblance, and after death becomes his equal and associate. God and man are therefore not only the same, but both in the same manner are everything that exists. The desire of the deity to renew the world assumed the shape of a female form; and this form is Mâyâ (q.v.), or illusion, with whom he begot the triad, Brahman, Vishn'u, and S'iva. To understand the falsehood of Mâyâ is the chief aim of man; and so long only as he is ignorant of the source of life, he is doomed to Transmigration (q.v.). Life, they teach, being the gift of God, must not be violated by His creatures. Humanity and truth are two of their cardinal virtues; retirement from the world is deemed desirable; and implicit devotion to the Guru, or spiritual teacher, a supreme duty. It is no part of their faith to worship any deity, or to observe any ceremonies and rites of the Hindus; but they are recommended outwardly to conform to all the usages of tribe and caste, and some even pretend to worship the usual divinities. They have no prescribed mode of dress. Strictly they can scarcely be included among Vaishn'ava sects; yet because of their paying more respect to Vishn'u than to any other god of the Trimûrti (q.v.), and of their friendly intercourse with most of the Vaishn'ava, they are always included with them. They have many subdivisions.

4. The *Vallabhâchâryas*, or *Rudra Sampradâyins*—a sect said to have been founded by *Vishn'u Swâmin;* but his successor, *Vallabha Swâmin*, or *Vallabha Acha'rya* (1479–1532), must be considered the real founder. The tradition is that in his 12th year he began to propagate his tenets. He gained converts, was introduced to the court

of the king of Vijayanagara, was elected as chief of the Vaishn'avas, travelled for nine years through India, and then was honored by a visit from the god *Kr'ishn'a* in person, who enjoined him to introduce his worship, and to found the religion now so widely diffused throughout w. India under the sectarian name *Rudra Sampradâya*. Vallabha ultimately settled at Benares, and there composed 17 works in Sanskrit. His sons and grandsons all were teachers and heads of communities of the sect, the most famous being Gokulnâthji (b. 1551). The chiefs of this sect have the title Mahârâj or 'great king;' and the members are of the better or wealthier classes of Hindus. The Mahârâjas, though many of them are ignorant and devoid of sanctity, receive from their followers unlimited homage solely because of their descent from the founder: at present they number 60 to 70. This sect is widely diffused throughout Bombay, Cutch, Kattywar, and central India, and especially the province of Malwa; and their establishments and temples are numerous throughout the country. The chief authority of the sect is the *Bhâgavata Purân'a* (q.v.), and after it the works of Vallabha. The object of their adoration is Vishn'u (q.v.) in his incarnation as Kr'ishn'a. Among the ten principles of the sect, as laid down by Vallabha, are the following: To secure the firm support of Vallabhâchârya: To forsake the sense of Vaidik opinion and be a suppliant to Kr'ishn'a: To believe that Vallabha is a Gopî, or mistress of Kr ishn'a: To swell the heart with the name of Kr'ishn'a: To adopt the society of the good, knowing them divine. Out of this code grew up the doctrine that the Guru or Mahârâj is the impersonation of Kr'ishn'a himself, that God and the Guru are necessarily to be worshipped, and that the sectary is bound to bestow on him 'his body, organs of sense, life, heart, and other faculties, and wife, house, family, property, with his own self'—a tenet which has led to the grossest abuses. The temples of the sect have images of Kr'ishn'a, and Râdhâ, his principal wife; the former representing a chubby boy, of dark hue, richly decorated, and eight times a day receiving the homage of his worshippers: these ceremonials include the washing and dressing of the image, which is then presented with refreshments, and anointed and perfumed, after which it is visited while it holds a public court. Annual festivals also are observed. The sect wear distinctive marks on the forehead and elsewhere.

5. The *Mâdhwâchâryas*, or *Brahma Sampradâyins*—a sect founded by a Brahman, *Mâdhwâchârya* (b. 1199), who is regarded as an incarnation of Vâyu, the god of wind, after having been incarnate in preceding ages as Hânumat (q.v.) and Bhîma. It seems that he was originally a priest of the S'aiva faith, and encouraged an attempt at compromise between the S'aivas and Vaishn'avas; and in the temples of his sect, images of S'iva are allowed to partake of the worship offered to those of Vishn'u. The essential dogma of this sect is the identification of Vishn'u with the Supreme Soul, as the pre-existent cause of the universe; and this primeval Vishn'u they affirm to be endowed with

real attributes, and, though indefinable, to be most excellent and independent. But besides this independent, there is also a dependent principle; for besides the Supreme Soul, *Paramâtman*, there is a living Soul, *Jîvâtman*, which is dependent on the Supreme; and though indissolubly connected with, yet not the same with him. In consequence, they deny the absorption of the human soul into the universal spirit, and the loss of independent existence after death. Thus they differ on a vital point of doctrine from other Vaishn'ava and S'aiva sects. The modes of worshipping Vishn'u they declare to be three: marking the body with his symbols, especially by a hot iron; giving his names to children and objects of interest; and the practice of virtue in word, act, and thought. Final liberation, or freedom from future birth, they consider as the reward for having secured the favor of Vishn'u. The Gurus or superiors of this sect are Brahmans and ascetics, or profess cenobitic observances; the disciples live in their *Maths*, or monasteries, and profess perpetual celibacy. The marks common to the Gurus and the lay votaries are the symbols of Vishn'u on shoulders and breast, and the frontal mark.

6. The *Vaishn'avas of Bengal*—sect forming one-third to one-fifth of the population of the province; were founded by *Chaitanya*, b. 1485. He is regarded as an incarnation of Kr'ishn'a. At the age of 24 he became an ascetic, travelled and taught his doctrine, and had frequent visions of Kr'ishn'a. According to the doctrine of the sect, *Kr'ishn'a* is the Supreme Spirit, who, for various purposes, assumed specific shapes, in which he became incarnate (see VISHN'U). An important innovation is the doctrine of *Bhakti*, or faith, which is held to be more efficacious than knowledge, or charity, or virtue—so efficacious, indeed, that all castes become by such faith equally pure, and therefore all castes are admissible into the sect. Their chief ritual is very simple; it consists of constantly repeating the name of Kr'ishn'a—a practice of which one of their chiefs, Haridâs, set them a remarkable example, as during many years, when he resided in a thicket, he repeated the name of Kr'ishn'a 300,000 times daily. Their other duties are sixty-four in number; but the most important of their obligations is their servile veneration of the spiritual teacher, whom they are bound to regard as the deity himself, and even as of more authority; for they are taught that 'the prayer is manifest in the Guru, and the Guru is Vishn'u himself.' Liberation from terrestrial existence most votaries of this sect do not conceive in the spirit of the Vedânta, which teaches that final deliverance is the absorption of the human soul into the divine essence; but, in their opinion, it is twofold: either perpetual residence of the soul in Swarga, or paradise, with possession of the divine attributes of power, etc.; or elevation to *Vaikun't'ha*, the heaven of Vishn'u, where they enjoy felicity. Besides several divisions of this sect, there are three which are secessions—the *Spasht'a Dâyakas*, the *Kartâ Bhâjas*, and the *Sâhujas*. The first of these is growing

in Calcutta, where their women act as the spiritual teachers of the women of respectable families: this sect deny the divine character and authority of the Guru. The second sect is a recent schism. Of the *Sâhujas*, the last of the three, little is known, their professions and practices being kept secret, but suspected to be immoral.

Besides these Vaishn'ava sects there are about a dozen others of less importance.—For fuller detail, see H. H. Wilson's *Sketch of the Religious Sects of the Hindus*, edited by Dr. Rost in Wilson's Works, I. (Lond. 1862); and on the Vallabhâchâryas, the *History of the Sect of the Mahá-râjas* (by Karsandâs Mulji) (Lond. 1865).

VAISYA, n. *vīs'yă:* in *India*, the third or merchant caste of the Hindus: see CASTE: SUDRA.

VAIVODE, n. *vī'vōd:* formerly, a prince of the Danubian provinces; an inferior Turkish officer; also spelled WAIWODE, VOIVODE.

VAKEEL, n. *vâ-kēl':* in the *East Indies*, an ambassador; a representative; a native attorney or agent.

VALAIS, *vá-lā'* (Ger. *Wallis*): canton of Switzerland; bounded n. by the cantons of Vaud and Bern, and s. by Italy; 2,026 sq. m. It forms one long and deep valley, included between two of the loftiest mountain chains of Europe—the Pennine and the Bernese Alps—and is drained by the Upper Rhone, which, rising at its n.e. extremity, in the glacier of the Gallenstock, falls at the w. boundary of the canton into the Lake of Geneva. No European territory is more completely isolated by mountains. The highest point of the canton is Monte Rosa, 15,127 ft. The greater part of the surface consists of barren mountain slopes; covered in their higher elevations with the greatest of the Swiss glaciers. The forests and pasture-lands supply the inhabitants with their chief occupations; but grain-cultivation also is carried on in the level ground, from a quarter of a m. to three m. wide, along the main channel of the river. The heat at the bottom of the valley is intense in summer, and Indian corn and the vine are successfully grown. V. is connected by great high-roads, and now by railway, with the other parts of French Switzerland and Savoy. The Grimsel and Gemmi passes connect the e. part with German Switzerland; and the Great St. Bernard and Simplon (q.v.) passes connect it with Italy. Cattle, the chief export of V., were formerly driven over the Simplon into Italy; but now the railway tends to divert this trade to w. Switzerland and France. The inhabitants of the Upper V.—one-third of the population—speak German; those of the Lower V., the Vaudois dialect of French. The inhabitants are mostly Rom. Catholics. V. is divided into 13 dixaines or 'tithings,' each of which has its council, and may be said to form a little republic. Each of the dixaines sends four members to a larger council or diet at Sion.—The upper part of V., during the middle ages, acknowledged a very slight feudal dependence on the German empire; the lower part belonged to Savoy. At the period of the struggle of the Swiss with the Duke of Bur-

gundy, the Upper Valais took possession of the Lower Valais, and reduced it to a vassal state; it remained in this condition until 1798, the period of French conquest. Sion and Martigny are the chief towns.—Pop (1900) 114,438.

VALANCE, n. *văl'lăns,* or VAL'ENCE, n. *-ĕns* [probably from having been made at *Valence,* in France]: drapery hanging round the head and stead of a bed, or from the head of window-curtains: V. to decorate with fringed drapery. VAL'ANCING, imp. VAL'ANCED, pp. *-ănst.*

VALCKKENAER, *vâl'kĕh-nâr,* LUDVIG KASPAR: Dutch philologist: 1715-1785, Mar. 14; b. Leeuwarden. He studied at Franeker, and became prof. of Greek there 1741; of Greek antiquities 1755; and in 1766 was called to the chair of Dutch history at Leyden, where he died. Valckenaer was an admirable lecturer and commentator on the classics, adding fine critical discernment and thoughtfulness to thorough knowledge of Greek literature and antiquities. Among his more notable works are his recasting of Ursinus's *Virgilius cum Scriptoribus Græcis Collatus* (Leeuwarden 1747): his ed. of the Greek grammarian Ammonius (Leyd. 1739; Leip. 1822), of the *Phœnissæ* (Franek. 1755; Leip. 1824) and the *Hippolytus* (Leyd. 1768; Leip. 1823); his *Diatribe in Euripidis Perditorum Dramatum Reliquias* (Leyd. 1767; Leip. 1824); his ed. of the so-called *Epistles of Phalaris* (Gröning. 1777), and of the *Idylls* of Theocritus (Leyd. 1779-81; new ed. Leip. 1810). Among his posthumous works are *Callimachi Elegiarum Fragmenta* (Leyd. 1799); *De Aristobulo Judæo* (Leyd. 1806); and *Opuscula Philologica, Critica, Oratoria* (2 vols. Leip. 1808).

VAL'DAI HILLS. See NOVGOROD.

VALDÉS, GABRIEL DE LA CONCEPCIÓN (PLACIDO): Cuban poet; b. Matanzas, Cuba, 1809, Mar. 18; d. Havana, Cuba, 1844, June 28. He was a mulatto and his early life was spent in poverty. His poetry was popular and was published in different newspapers and reviews, but the sentiments expressed seem to have involved him in trouble with the authorities, as he was at one time imprisoned for several months. In 1844 he was accused of complicity in a conspiracy of the blacks against the whites, and, though innocent, was shot as a traitor. He was author of various romances and novels, and his poems have been published in several editions. Perhaps the best of his verse is his prayer, composed just prior to his death and which was translated into English by Mary Webster Chapman. Editions of his works include *Poesías de Placido* (1838); *Poesías de Gabriel de la Concepción Valdés, Placido* (1847).

VALDES (VALDESSO VALDEZ), JUAN DE: Spanish-Italian reformer: b. Cuenca, Castile, 1500; d. Naples 1544. He was brother to Alphonse de Valdes, the imperial sec-

retary of state, and was himself secretary to Charles V. in Germany. After a sojourn of ten years he left Germany and went to Naples to occupy the post of secretary to the viceroy. There he devoted himself to literature and gathered around him a band of choice spirits, including Vermigli (see PETER MARTYR), Ochino, and the high-born ladies Vittoria Colonna, Julia Gonzaga, and Isabella Manriquez. Valdes and his company were enthusiastically set upon effecting the regeneration of the church of their day, but although they had no desire to leave the Roman obedience, they were regarded as heretics. Valdes wrote *Spiritual Milk; The Christian Alphabet,* and some commentaries on the New Testament. He wrote in the Spanish language, but the works above mentioned are only extant in their Italian translations.

VALDIVIA, *vâl-dē'vē-â:* city of Chili, capital of the province of Valdivia; on the river Valdivia, 470 m. s. of Santiago; lat. 39° 49′ s., long. 73° 15′ w. It has one of the best harbors on the Pacific coast. The town is built on level ground, and is surrounded by apple orchards and native forest. It has an active coasting trade, chiefly with Valparaiso. Valdivia was founded in 1551 by Pedro de Valdivia, one of Pizarro's lieutenants, and it was at one time a place of great wealth. Pop. (1900) 9,819.

VALDIVIA, *vâl-dē'vē-â,* PEDRO DE: soldier: about 1505-59; b. Spain. He was in the memorable battle of Pavia 1527; accompanied Pizarro to Peru 1532; served in the conquest of Venezuela 1535; rendered effective service to Pizarro in his struggle with Almagro; conquered Chili 1540, and there founded the cities Santiago and Coquimbo. On the assassination of Pizarro, Valdivia returned to Peru and sided at first with Pizarro's bro. Gonzalo, against the viceroy, but afterward aided the royal government in suppressing Gonzalo's rebellion. Then, as captain general of all the regions s. of Peru, Valdivia made several brilliant military expeditions, and founded the cities Concepción, Villa Imperial, Villa Rica, Valdivia. He was taken prisoner and put to death by the Araucanians.

VALDOSTA, *văl-dŏs'ta,* Ga.: city, county-seat of Lowndes co.; on the Georgia Southern & Florida, the Plant System, and the Atlantic, Valdosta & Western railroads; about 150 m. s.w. of Savannah. It was settled in 1859 and in 1860 was incorporated. It is in a fertile agricultural region, the principal products of which are cotton, fruit, corn, wheat, and vegetables. The chief manufactures are cotton products, including cotton cloth, and lumber products. The city owns and operates the waterworks. There are three banks, having a combined capital of $270,000. The government is administered under a revised charter of 1900, which provides for a mayor, who holds office two years, and a city council. Pop. (1900) 5,613.

VALE, n. *vāl:* a poetic word for VALLEY (q.v.).

VALE: see VAIL 1.

VALEDICTION, n. *văl'ĕ-dĭk'shŭn* [L. *valĕ*, farewell; *dictus*, pp. of *dicĕrĕ*, to say]: farewell; a bidding farewell. VAL'EDIC'TORY, a. *-dĭk'tĕr-ĭ*, bidding farewell: N. in *Amer. colleges*, an oration or address delivered on bidding farewell.

VALENCE, *vâ-lŏngss'*: town of France, cap. of the dept of Drome; on a hill on the left bank of the Rhone, here spanned by a fine suspension bridge; 65 m. s. of Lyon, on the railway to Marseilles. The walls with which it is surrounded give it a gloomy appearance, and the streets are narrow. It is the seat of a bp., and has a cathedral founded in the 3d c., but rebuilt in the 11th c., and consecrated by Urban II. 1095. Silk-weaving and silk-throwing are among the chief industries, and there is considerable trade in silk, fruits, wines, etc.—Pop. (1891) 22,947.

VALENCIA, *vâ-lĕn'shĭ-a*, Sp. *vâ-lĕn'thē-â:* province of Spain; one of three provinces into which the former 'kingdom' of V. was divided 1834, the others being Alicante and Castellon de la Plana (see SPAIN); bounded n. by Teruel and Castellon de la Plana, e. by the Mediterranean, s. by Alicante, w. by Albacete and Cuenca; 4,352 sq. m. V occupies the centre of the ancient kingdom. Along its coast it is level, but rises toward the w. in a series of table lands which in some parts rise into mountains 4,000 ft. high. The principal rivers are the Guadalaviar and Jucar, which supply an extensive system of irrigation. Wheat, maize, barley, oats, rye, esparto-grass, and fruit of all kinds are extensively grown, and the mulberry is cultivated for silk. Numerous herds of sheep and goats are pastured on the higher grounds, and there is considerable coast fishing. The manufactures include silk, glass, pottery, leather, and soap.—Pop. (1900) 806,556.

VALEN'CIA: ancient city and port of Spain, formerly cap. of the kingdom of V., now of the prov. of V.; on the right bank and 3 m. from the mouth of the river Guadalaviar, 304 m. e.s.e. of Madrid by railway. The Huerta, or 'garden,' 35 sq. m. in extent, in which the city stands, resembles an immense orchard, and is ingeniously watered by an intricate network of pipes and rivulets, laid down by the Moors eight centuries ago. In this garden the carob, citron, orange, palm, and mulberry grow in wild luxuriance. V. is surrounded by battlemented walls, erected by Pedro IV. 1356; the interior of the city is striking and pleasing; most of the streets are macadamized; in the old quarters the houses are closely packed and gloomy-looking, but in the newer parts the buildings are high, gayly-colored, decorated with elegant iron-gilt balconies, and furnished with courts freshened with flowers and cooled by fountains. V. is the see of an abp., and its cathedral, La Seo, begun 1262, classical in the interior and Gothic in the exterior, is 350 ft. long, and at the transepts 216 ft. wide. In the cathedral and its chapels are a number of magnificent pictures, including some by Ribalta and Joanes. The custom-house, dating from 1758, is now

a cigar factory, employing 3,500 women. The univ., with public library of 42,000 vols., is well attended. Silk spining and weaving are extensively carried on, also hemp and cloth weaving, and manufactures of hats, glass, linen, leather, and V. tiles for flooring. V. is now a prosperous summer resort for the people of Madrid.

V., or *Valentia de Cid*, is very ancient. It was destroyed by Pompey, and rebuilt by Sertorius, after which it became a *colonia* or colony. It was taken by the Goths 413, and by the Moors 712. The *Cid* (see CID CAMPEADOR) took it 1094–5, and ruled despotically here till 1099. The union of Ferdinand and Isabella brought it under the Castilian crown. Suchet captured the city 1810.—Pop. (1884) 144,048; (1887) 170,763; (1900) 213,530.

VALEN'CIA: town of Venezuela, S. America, province of Carabobo; 85 m. w.s.w. of Caracas, about 2 m. e. of the Lake of V.; and about 20 m. from Puerto Cabello, on the coast, with which and with Caracas it has active trade. V. is finely situated in an exceedingly fertile district, in which cattle and horses are raised in great numbers.—Pop. about 40,000.

VALENCIA, n., or VALENTIA, n. *va-lĕn'shĭ-a* [etym. not apparent]: fabric of worsted, cotton, and silk for vests.

VALENCIA, or VALENTIA, *vâ-lĕn'shĭ-a:* island on the s.w. coast of Ireland; part of county Kerry; separated from the mainland by a narrow arm of V. Bay; 38 m. w.s.w. of Killarney. It is 5½ m. long and 2 m. broad; the soil is in many places good; half the entire area is under cultivation. On the w. side, which is mainly high rocky moorland, are valuable slate and flag quarries. On the n. side is V. Bay, inlet of Dingle Bay; and V. harbor, the most w. in Ireland. Four Atlantic cables have been landed here, 1865, 66, 73, and 74. That laid in 1865 is not now in operation. Another Atlantic cable starts from Ballinskelligs Bay, a little to the s. of V. See ATLANTIC TELEGRAPH. Pop. 2,500.

VALENCIENNES, n. *vâ-lĕn'sĭ-ĕnz':* a rich lace, originally manufactured at Valenciennes in France.

VALENCIENNES, *vâ-lõng-sē-ĕn':* town and fortress of France, dept. of Nord; on the Escaut or Scheldt, 155 m. by rail n.n.e. of Paris. It is well built, but contains few objects of attraction. There are many pleasant promenades in the immediate vicinity. V. is famous for a kind of lace extensively made here, as well as for fine cambrics and woven fabrics and gauzes. Salt-making and sugar-refining are carried on, and there is active trade in timber, wine, and oil. It is the centre of a rich coal-field yielding one-fourth of the coal produced in France. Hence there are numerous foundries, rolling-mills, and machine-shops. V. is the birthplace of Watteau and Froissart.—Pop. (1886) 22,919; (1891) 28,700; (1901) 30,946.

VALENCY, *văl'en-sĭ* or *vā'len-sĭ* [from L. *valans*, having power]: in *chem.*, the relative capacity for combining possessed by an atom as compared with an atom of hydro-

gen, assumed as a standard. Of some elements one atom can replace only one atom of hydrogen; of other elements one atom can replace 1, 2, 3, 4, or more hydrogen atoms. Thus, when sodium, Na, is dissolved in hydrochloric acid, HCl, each atom of Na replaces one hydrogen atom; but each atom of zinc, Zn, under the same circumstances, takes the place of 2 hydrogen atoms:

$$Na + HCl = NaCl + H$$
$$Zn + 2HCl = ZnCl_2 + H_2$$

The zinc atom, then, has twice the V. or twice the combining power that the sodium has. Similarly, antimony, Sb, and bismuth, Bi, form trichlorides, $SbCl_3$ and $BiCl_3$—an atom of Sb and Bi in each case taking the place of 3 H atoms. So, too, tin, Sn, in the tetrachloride, $SnCl_4$, and phosphorus, P, in the pentachloride, are equivalent to 4 H and 5 H respectively. The difference in combining or saturating power is represented thus: O″, B‴, C⁗, or C^{iv}, and so on. The chemical elements are classed with respect to V. as:

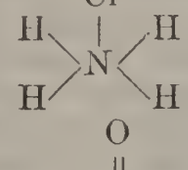
Univalent elements,	or Monads,	e.g.,	H
Bivalent "	" Dyads,	"	O″
Trivalent "	" Triads,	"	B‴
Quadrivalent "	" Tetrads,	"	C^{iv}
Quinquivalent "	" Pentads,	"	P^{v}
Sexvalent "	" Hexads,	"	W^{vi}

And elements of even V.—dyads, tetrads, hexads—are classed together as *artiads* [Gr. *artios*, even]; elements of uneven V.—monads, triads, pentads—are designated *perissads* [Gr. *perissos*, uneven]. Another mode of expressing the V. of elements is that of arranging the symbols in diagrams in which each element is connected with others by a number of lines or connecting bonds corresponding with its degree of equivalence—a monad being connected with other elements by only one such bond, a triad by 3, a pentad by 5, etc.—e.g.:

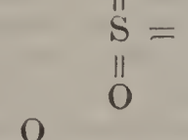
Water, H_2O ..... H — O — H

Carbon dioxide, CO_2 ..... O = C = O

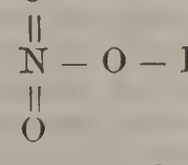
Ammonium chloride, NH_4Cl .....



Sulphuric oxide, SO_3 .....



Nitric acid, HNO_3 .....



It must be understood that these *graphic, structural,* or *constitutional* formulæ are not intended to represent the actual arrangement of the atoms in a compound. The

lines connecting the different atoms indicate simply the number of units of V. belonging to each atom, and the manner in which these units are disposed of by combination with those of other atoms.

Some elements are *multivalent*—i.e., exhibit varying degrees of V.—e.g., carbon is quadrivalent in marsh-gas, CH_4, bivalent in carbon monoxide, CO; sulphur is sexvalent in the trioxide, SO_3, but quadrivalent in the dioxide, SO_2, and bivalent in hydrogen sulphide, H_2S.

VALENS, *vā'lĕns* or *văl'ĕns*, Emperor of the East: 328–378, Aug 9 (reigned 364–378); b. near Cibalis, Pannonia: brother of Valentinian I. (q.v.), with whom he was associated in imperial authority, receiving, as his share of the empire, Asia, Egypt, and Thrace. His sovereignty was, however, disputed by Procopius, supposed scion of the race of Constantine, who raised his standard in Thrace, was crowned at Constantinople, and for two years held his ground with skill and courage, till the defeat of his troops at Thyatira and Nicosia, and his capture and cruel death, 366. The first prominent act of V.'s reign was a reduction of 25 per cent. in the taxes, which gained the general good-will of his subjects. The prolonged imprisonment of 3,000 Ostrogoths, sent to aid Procopius, led to a war 367–369: the contest was carried on in the country of the Goths, and was in favor of the Romans. Difficulties arose immediately afterward (370) with the Persians, who were desirous of possessing Armenia; and though the troops of V., as the ally of the Armenian monarch, frequently came into collision with those of Persia, war was not declared till the end of 372. The Romans were victorious. V., who had removed to Antioch at the beginning of the war, now occupied himself with the religious quarrels of the Arians and the orthodox party, then raging over the whole eastern empire. Incapable of independent judgment, he had adopted the views of his Arian councilors, and under their guidance punished the more obstinate of the 'heretics.' At the same time, a conspiracy, prompted by professors of magic arts, who declared that the name of V.'s successor should begin with *Theod*, was discovered, its promoters and agents punished with death, as well as those whose names began with that unlucky prefix. Affairs on the e. frontier again assumed a threatening aspect; but the Romans, disinclined further to interfere with the Persians, concluded a somewhat discreditable treaty 376. Meanwhile the Goths, who had for some time been peacefully settled in Dacia, were assailed by the advancing hordes of the Huns; the Ostrogoths, the first to feel the shock, were partly incorporated, and the remainder forced to retreat; the Visigoths next attempted to stem the torrent, but without success, and a multitude of fugitives crowded to the n. bank of the Danube. V. gave permission to a large body of Goths under Fritigern to cross into Mœsia and Thrace, and take possession of the waste lands in these provinces; the fugitive Ostrogoths soon afterward crossed the river without permission; and the alarm which the numbers and turbulence of his new subjects speedily

aroused led V. to the adoption of such impolitic measures that the gratitude of the Goths for the shelter afforded was turned to bitter resentment. V. resolved on war; and marching against the barbarians, engaged them near Adrianople 378, Aug. 9. His army was totally routed, and two-thirds of it, including V. himself and most of his chief officers, left dead on the field.—See Gibbon's *Decline and Fall*, chaps. xxv. and xxvi.; Tillemont's *Histoire des Empereurs*, V.

VALEN'TIA: Irish island: see VALENCIA.

VALENTINE, n. *văl'ĕn-tīn:* letter containing some pictured representation conveying sentiments of love or burlesque, sent by one person to another on Feb. 14, the day of the festival in the Chh. of Rome in honor of St. *Valentine*, and the day on which birds were popularly supposed to choose their mates; a love-letter: a sweetheart.

VALENTINE, *văl'ĕn-tīn*, BASIL: German alchemist, of whom little is known: 12th c., according to some, but more probably end of the 15th c. It has been stated that he was a monk of the order of St. Benedict, in St. Peter's Convent at Erfurt; but his name does not appear on the list at Erfurt, nor on the general list at Rome. V. was a diligent seeker for the philosopher's stone, and wrote, mostly in the Old Upper Saxon dialect, a number of works, chiefly on the process of transmutation. Lenglet's *History of the Hermetic Philosophy*, III., contains a complete list. Some of the titles are curious—e.g., *Basil Valentine's Twelve Keys of Philosophy, Apocalypsis Chymica, Revelation of the Mystery of the Essential Colors of the Seven Metals, The Triumphal Car of Antimony, A Chemico-philosophical Tract concerning Things Natural and Præternatural*, etc. These were not printed till 1602; later, many were pub. as French translations; a few still remain in MS.

VALENTINE, *văl'ĕn-tīn*, EDWARD VIRGINIUS: sculptor: b. Richmond, Va., 1838, Nov. 12. In boyhood he attended lectures on anatomy in Richmond: he was first stimulated to love of plastic art on visiting the exposition of 1851 at New York. Returning to Richmond, he took lessons in drawing and modelling, and 1859 visited Paris, where he became pupil of Couture. Then he studied his art in Florence under Boaniuti, and in Berlin under Kiss, who was to the young American student not only a master but a warm friend. In Berlin he studied also drawing and the history of art. Returning to Richmond after the war, he exhibited a statuette of Gen. Robert E. Lee. He has executed portrait busts of Gens. Beauregard, J. E. B. Stuart, 'Stonewall' Jackson, Albert Sidney Johnston, and other southern leaders; a reclining figure of Gen. Lee in the chapel of Washington and Lee Univ.—one of the noblest works of monumental sculpture in America; a bronze statue of John C. Breckinridge; a statue of 'Stonewall' Jackson for Lexington, Va.; also several noteworthy ideal and historic figures and groups, among them *Andromache and Astyanax*, his greatest work in that class.

VALENTINE'S DAY, St.: day commemorative of two saints (out of a great number of the same name), formerly observed in England, Scotland, and parts of France, by peculiar and amusing customs in relation to an allotment of young men and young women to each other. In the 15th c. this amusing observance of the day was popular with the upper classes and in vogue at European courts. The imaginary engagements made in sport on that day were supposed to hold good through the year, and often resulted in weddings.—In later times the observance degenerated to the sending of tender or ridiculous love-letters, and was long in usage in the United States. In recent years it has been almost discarded as an absurdity and a nuisance.—The two saints of the early centuries that seem to have had commemoration on the day, were Valentinus, presbyter and martyr (beheaded Feb. 14), and Valentinus of Interamna, bp. and martyr. How the peculiar observance came to be associated with the day of these saints is not known.—See Brand's *Popular Antiquities;* Chambers's *Book of Days*, I.

VALENTINIAN, *văl-ĕn-tĭn'ĭ-an* (Valentinianus, *văl-ĕn-tĭn-ĭ-ā'nŭs*), I., Roman Emperor: 321–375, Nov. 17 (reigned 364–375); b. at Cibalis, Pannonia; son of Gratianus (a rope-maker who had enlisted in the army, and risen to the grade of *comes militum*). V. entered the army at an early age, and, aided by the military renown of his father, rapidly rose in rank under Emperors Constantius and Julian; but was degraded by Constantius 357, and, for his publicly expressed contempt for paganism, banished by Julian 362. Restored to favor in the following year, he distinguished himself in the East, and on the death of Jovian was unanimously chosen as his successor 364, Feb. 26. A month after his accession, he chose as his colleague his brother Valens (q.v.), to whom he resigned the govt. of the East, reserving for himself Illyricum, Italy, the Gauls, Britain, Spain, and Africa. During V.'s reign, the utmost vigilance was required to preserve the frontier districts of the empire, now in its decay, from the ravages of the barbarians, who, like vultures, had gathered round their prey. The Alemanni repeatedly (366–368) ravaged the e., and the Saxons (370) the n e., of Gaul; Illyricum was wasted (370) by the Quadi, and Africa by the s. desert tribes. The internal administration was excellent, for the emperor added vigilance and impartiality to his ability, prudence, and firmness; and his cognizance of any abuse or injustice, by whomsoever perpetrated, was the signal for its speedy rectification and the punishment of the offender. Though himself a zealous churchman, he repelled the solicitations of the bishops who wished him to interfere in the religious disputes of the time, permitted his subjects to adopt whatever religion they chose, and strictly forbade all persecution or annoyance on account of religious belief, even maintaining the 'pontifices' of the provinces in the privileges which they had possessed under Julian. On account of the scandalous abuse by ecclesiastics of their influence

over their penitents, he excluded priests and monks from the right of succession to property; judicial proceedings were forbidden to be held in private; the extreme license of speech hitherto allowed to advocates was restrained; gratuitous medical attendance was provided for the poor of Rome; and schools were established throughout the empire. The success of V.'s administration was doubtless due in great part to his fortunate choice of officers: Theodosius the Elder in Africa and Britain, Jovinus in Gaul, and Theodosius the Younger (afterward emperor) in Illyricum, form a trio distinguished by loyalty, administrative ability, and military talent, contrasting strongly with their predecessors in office. V.'s private life was a model of morality and economy; and, according to the summation of the trustworthy Ammianus, 'he had so many good qualities that, if everything had been equal in him, he would have been another Trajan or Marcus Aurelius.' His one fault was an ungovernable temper, which led him into occasional excessive cruelties, and ultimately caused his death. While giving audience to the deputies of the Quadi, with whom he was at war, he worked himself into such a passion as to rupture a blood-vessel in his chest, and he fell back dead in the arms of his guards. By his first wife, he had one son, Gratianus (q.v.); and by the second, Justina, another son, Valentinian, and three daughters, one of whom, Galla, became wife of Emperor Theodosius I.

VALENTIN'IAN (Valentinia'nus) II., Emperor of part of the Western Roman Empire, consisting of Italy, Illyricum, and Africa—his half-brother Gratianus (q.v.) ruling the rest: 372–392, May 15 (reigned 375–392); younger son of Valentinian I. by his second wife, Justina. During his long minority, Empress Justina administered the govt. from Milan. V., who had given promise of good administrative qualities, was murdered by a Frank named Arbogast, whom he had dismissed.

VALENTIN'IAN III., Emperor of the Western Roman Empire: 419–455, Mar. 16 (reigned 425–455); grand-nephew of Valentinian II., and son of Constantius III. by Placidia, daughter of Theodosius the Great and Galla. V. was a weak and contemptible prince, yet his reign is one of the interesting epochs of Roman history, exhibiting the internal weakness and corruption of the empire, the gradual closing with it of its irresistible barbarian foes; the sad picture lightened from time to time with a flash of the warrior-spirit of old Rome. V. may be said never to have ruled though he sat on the imperial throne for 30 years: his mother, Placidia, governed till her death 450, and was succeeded by the eunuch Heraclius. The regulations enacted for the internal administration were creditable, especially when ecclesiastical interests were involved. But the corruption of manners, the extinction of 'public spirit,' the exactions of the tax-collectors and of the commissioners who were appointed to prevent these exactions, the general employment of the powers of the executive in avenging private quarrels, and the impossibility of obtaining redress for injuries, plainly showed that the empire had fallen beyond

remedy, and that, if not destroyed by assailants from without, it would of itself speedily crumble to pieces. The early part of V.'s reign was disturbed by the contests between the 'comites' Boniface and Aëtius, the former of whom had supported, and the latter resisted, V.'s claims to the throne. Aëtius by his calumnies prevailed on the empress to declare the upright governor of Africa a public enemy; and the latter, in his resentment, called to his aid the Vandals under Genseric (q.v.), and Africa was lost to the empire. Though the Franks, Goths, Burgundians, and other German nations who had encroached on the empire, were successively defeated and repelled by Aëtius, and the destructive career of the formidable Huns brought almost to a close on the field of Chalons, the labor of defending an extensive empire from attack on all sides was too great; consequently much of Spain and Gaul was ultimately seized by the Suevi and Visigoths, n. Italy was ravaged by the Huns, Sicily and Sardinia by the Vandals, and even Rome repeatedly besieged, while Britain was abandoned to the Picts and Scots, and the empire practically dismembered. Aëtius was murdered 454. V., who had ravished the wife of his intimate friend Maximus, was murdered in the following year by friends of Maximus and Aëtius.

VALENTIN'IANS: Gnostic sect or school; followers of Valentinus, native of Egypt, but supposed to have been of Jewish origin, who went from Alexandria to Rome about 138, and there introduced a strange compound of Judaism and Gnosticism. Valentinus is said to have died at Rome (or, according to others, at Cyprus) about 160. He is said to have claimed that his doctrines were received partly from a pupil of the apostle Paul, and partly by direct revelation. He divided the higher spiritual world into 15 pair of æons (see ÆON), each consisting of a male and a female. The first pair, or syzygy, is made up of Bythos, or God in Himself, and Ennoia, or God as existing in His own thoughts; from these emanated Nous (Intelligence) and Aletheia (Truth), and so on. As the last æon, Sophia (Wisdom) transgressed the bounds that had been laid down by the æon Horos, and a part of her being became lost in Chaos, and there was formed a crude being, called Achamoth, which, through the Demiurge (q.v.) that emanated from it, created the corporeal world. Horos now imparted to the souls of men (for all the bodies composing the corporeal world are possessed of souls) a *pneumatic* or spiritual element; but this attained to full activity only when Christ, a collective emanation from all the æons, appeared as Saviour, and united himself with the man Jesus. In the end, all that is pneumatic, and even the originally psychic or soul element in as far as it has assimilated itself to the psychic, will return into the Pleroma (q.v.): see GNOSTICS.

VALENTINITE, n. *văl-ĕn'tĭn-īt* [after Basilius *Valentinus*]: white oxide of antimony, a mineral of a whitish-gray color, found in veins in the primary rocks along with other ores of antimony, lead, and zinc.

VALENZA, *vâ-lĕn'zâ* (*Valentia Valentinum Forum*): city on n. Italy, on an elevated plane, on the right bank of the Po, 8 m. n. of Alessandria. It is very regularly built, and commands a fine view of the surrounding vine-clad hills. It carries on a trade in wine, and manufactures of silk, flax, and hemp fabrics.—Pop. about 7,000.

Valenza, a very ancient town, belonged to the Liguri, and was conquered by Marcus Fulvius, the proconsul, who named it *Forum Fulvii, quod Valentinum.* In 1635 it was besieged for 50 days by the armies of France, Savoy, and Parma, and was taken. In 1707 it came into the possession of Victor Amadeus II., Duke of Savoy; 1805 the French destroyed its gates and fortifications; and 1815, after the fall of Napoleon's empire, it reverted to the king of Sardinia.

VALERA, Don Juan y Alcala-Galiano; *ô-än' ē äl-kä-lä' gä-lē-ä'nō vâ-lā'rä:* Spanish author and diplomat; b. Cabra near Cordova, 1824, Oct. 18; d. Madrid, 1905, Apr. 19. He studied for the legal profession at Granada, but after leaving the university, entered the diplomatic service, and in succession was secretary of legation at Naples, Lisbon, Rio Janeiro, Dresden, and St. Petersburg. He was elected deputy in 1859, and became minister of commerce and agriculture in the cabinet of Narvaez, subsequently being minister at Frankfort for several years. He took an active part in the Spanish revolution of 1868, and was a member of the delegation sent to Florence in 1870, to offer the crown of Spain to Prince Amadeus of Savoy. He then became professor of foreign literature in the university of Madrid, but soon after resumed his diplomatic career, being appointed ambassador successively to Portugal, the United States (1884-86), Belgium, and Austria-Hungary. While prominently known as a diplomat and statesman, he became equally well known as an author, poet, and critic. His first volume, *Poesias,* was published in 1858, in his thirty-fourth year. His best-known work, *Pepita Jimenez,* inaugurated a revival in Spanish romance, and has been translated into many languages: *Las ilusiones del Doctor Faustino* (1876); *El Comendador Mendoza* (1877); *Estudios Criticos* (1864-84); *Rios Argentinos* (1901); are included in a long list of writings of which a collected edition was issued as *Colleccion de Escritores Castellanos* (1885).

VALERIAN, n. *vă-lē'rĭ-ăn* [L. *valērĕ,* to be strong; to be in health]: a plant, most of whose species are very ornamental in flower-borders, and which have stimulant and aromatic qualities; the *Valerĭāna officinālis,* ord. *Valerĭanācĕæ:* the Greek valerian is *Polemōnĭum cærulĕum,* ord. *Polemonĭācĕæ.* Vale'rian'ic, a. *-ăn'ĭk,* of or from valerian. Valerianic, or Valeric acid, an acid which can be extracted from the root of *Valerĭāna officinālis,* the product being neutralized with mag-

nesia. VALERONE, n. *văl'ĕr-ōn*, a colorless fluid, lighter than water, obtained by the distillation of valerianic acid.

VALERIAN: the type genus (*Valeriana*) of the valerian family, herbs or shrubs having flowers with 5-parted perianths, and funnel-shaped, short-spurred corollas which are generally of a pale rose-color. The calyx, which is rudimental when in flower, becomes a feathery pappus at the top of the fruit. The leaves are simple or pinnate, without stipules, and the small blossoms are gathered into profusely branched cymose inflorescences, usually terminal. They have a spicy, aromatic odor, very grateful in spring, and are sometimes so fragrant, as in the case of *Valeriana sitchensis* and *Valerian officinalis* as to suggest heliotrope. The latter species is the common, or great wild valerian, which is cultivated in gardens for its flowers and its root. It has an erect stem, from 2 to 5 feet tall, with pinnate leaves and toothed leaflets, and very fragrant flowers in pale tones of lavender, pink, and white. The ascending rhizome, with many fibrous roots, has a peculiar, pungent and most disagreeable odor, due to the volatile oil of valerian contained in it, which grows stronger and worse when old. The taste is bitter, and like camphor, and the root is an officinal drug, which is a stimulant and anodyne, used in hysteria, and as an antispasmodic. Cats are very fond of the odor of valerian, and tear the plant to pieces and roll in it for very joy. They are said even to dig up the roots and devour them. A bit of the root is also used as a bait for catching rats. The carrot-like roots of *Valeriana edulis*, a tall glabrous plant of the western United States with undivided stem leaves, and yellowish-white flowers in elongated panicles, are eaten by the Indians either raw or dried. The Pah-Utes even grind it into flour and use it in the form of bread or mush. Nard is a name given to various species of valerian, but particularly to the *Valerian celtica*, employed by eastern nations as a substitute for spinkenard in their scented baths; it is, likewise, called Celtic spikenard, and, like the Cretan spikenard (*Valeriana phu*), has medicinal properties similar to, but weaker than, the officinal valerian. The Greek valerian is *Polemonium cæruleum*, mistaken by old herbalists for the valerian described by the ancient Hellenes, and the name has been applied to the whole genus, including the creeping American *Polemonium reptans*, with delicate nodding corymbs of pale blue flowers. *Centranthus ruber* is the scarlet lightning or spurred or red valerian, cultivated for its oblong panicle of scarlet flowers. The African or Algerian valerian (*Fedia cornucopiæ*) is used as a salad plant in Algeria. It is low, glabrous and branching, with oval leaves, and tubular, long, pink flowers. It can be cultivated and eaten like corn salad, but is not so hardy.

VALERIANEL'LA: See CORN SALAD.

VALERIANUS, *va-lē-rĭ-ā'nŭs*, PUBLIUS LICINIUS,

Roman Emperor: reigned 253-260; of ancient and noble family, and mentioned first 238 as *princeps senatus*. After distinguishing himself in various posts, he was chosen for his integrity and accomplishments to the office of censor about 251. Faithful in his allegiance to Gallus, he went to summon the legions of Gaul and Germany to aid the feeble emperor against the usurper Æmilianus, but arrived too late to save his master. The usurper's troops, awed by the superior numbers of Valerianus's army and the stern sanctity of their leader's character, murdered their own chief, and united with their late antagonists in proclaiming Valerianus emperor 253. Valerianus was then about 60 years of age, and, feeling his inability to sustain, unaided, the cares of empire, assumed as colleague his eldest son, Gallienus. Valerianus during his short reign showed ardent zeal for the prosperity of the empire; but the times required a ruler of more energy and ability to deal with the grave disturbances which arose throughout the empire—the irresistible irruption of the Franks into Gaul, despite the utmost efforts of Aurelian, the devastation of Thrace, Macedonia, Greece, and of the Archipelago by the Goths, the advance of the Alemanni to Milan, and the conquest of Syria and Armenia by Shapur. The troubles in the East appearing most threatening, Valerianus went thither in person, and for some time was successful; but, pursuing his opponents too rashly, he was suddenly attacked by superior numbers at Edessa, completely defeated, and forced to surrender 260. His fate is unknown; but it is said that many indignities were heaped on the unfortunate captive by his haughty conqueror; that he languished till death in hopeless captivity; and that after his death his skin was flayed off and stuffed and preserved as a trophy.

VALERIC, or Valerianic Acid: C_4H_9COOH: Four acids of this composition are known. The one ordinarily known by this name is a monobasic acid found free and as ethereal salts in the animal and vegetable kingdoms, chiefly in valerian and angelica roots. It may be made artificially by the oxidation of ordinary amyl alcohol by chromic acid mixture. It is a colorless oily liquid, lighter than water, and possessed of a peculiar odor and a sharp acrid taste; somewhat soluble in water but very easily so in alcohol; unites with bases to form salts called valerates or valerianates and with alcohols to form ethereal salts. These latter are frequently of a rather agreeable odor and taste and for such are much used in the preparation of artificial fruit essences. Some of the metallic valerianates are used in medicine because of their slight sedative action.

VALERIUS ANTIAS: Roman historian: He lived in the middle of the 1st century of our era and his work was an account of Latin history from the founding of Rome, and comprised 37 books. It abounds in exaggera-

tion and fabulous incident. The author draws largely on Livy, as far as that author extends. The disjected remain of Antias are published in Peter's *Historicorum Romanorum Fragmenta* (1883).

VALERIUS CATO, PUBLIUS: Latin poet: He appears to have been born in Cisalpine Gaul in the 1st century B.C. During the dictatorship of Sulla, and the confusion caused by the proscriptions, he lost his estate, being then in his minority, and went to Rome as a needy student, although his talent as a critic and grammarian of the Alexandrian type eventually won him credit and distinction. Two poems, *Diræ* and *Lydia,* which long passed under Virgil's name, have been attributed to him on somewhat doubtful evidence.

VALERIUS CORVUS, MARCUS: Roman general: b. about 371 B.C.; d. about 271. In 349, being military tribune under Camillus in his campaign against the Gauls, he accepted the challenge of a gigantic warrior to single combat, and killed his antagonist with the assistance of a raven which perched upon the helmet of Valerius and as often as he advanced upon his foe flew at the Gaul's face. A general battle then ensued, in which the Romans were completely victorious. From this circumstance Valerius was considered one of the greatest of Roman heroes and was given the surname of Corvus (a raven). He was made consul the next year, and the same honor was conferred upon him five times afterward. In his third consulship, at the age of 29, he gained two victories over the Samnites at Mount Gaurus and at Suessula. In 342 he was appointed dictator on his quelling through his personal popularity a mutiny in the army. He was dictator again in 301, when he defeated the Marsi and Etruscans. He held curule dignities 21 times, repeatedly enjoying the honors of a triumph, and is referred to by the Roman writers as an example of the favors of fortune.

VALERIUS, FLACCUS SETINUS BALBUS, CAIUS: Latin poet: b. Padua, lived in the time of Titus and Vespasian; d. about 90 A.D. He wrote and dedicated to Vespasian the *Argonautica*, a poem in eight books, in which he narrates the adventures of Jason and his companions. This epic he left unfinished. He is merely a somewhat free translator of Apollonius Rhodius, whose work he tricks out with rhetorical flourishes, while in some passages he is so obscure as to be nearly unintelligible.

VALERIUS MAXIMUS, *vā-lē'rĭ-ŭs măks'ĭ-mŭs:* anecdotist, who appears to have lived in the 1st century. His work *Dicta Factaque Memorabilia* (9 books) has come down to our time substantially complete. In the middle ages Valerius Maximus possessed high authority, and not without reason, for he has preserved many authentic anecdotes of ancient worthies which else would have gone into oblivion. His style, though ornate, is chaste

and vigorous. Before 1490 fourteen editions of Valerius Maximus were given out from the press. He was translated into English by W. Speed, 1678.

VALET, n. *văl'ĕt* or *văl'ā* [F. *valet*, a servant, a valet —from OF. *vaslet* or *varlet*, a squire, a youth who served under a lord—a dim. of *vassal*, a vassal—from Bret. *gwaz;* W. *gwas*, a youth, a servant]: a male servant who attends on a gentleman's person; a body-servant; a waiting-servant. VALET DE CHAMBRE [F. *de*, of; *chambre*, a chamber]: a personal attendant.

VALETTA, *vâ-lĕt'tâ*, or VALLETTA, *vâl-lĕt'tâ:* important fortress and beautiful city, capital of the island of Malta; on the n.e. side of the island, lat. 35° 53′ n., long. 14° 31′ e. It occupies a tongue of land extending n.e. 9,600 ft., and generally about 3,600 ft. across, except at the extremity, where it narrows considerably and forms the famous Point of St. Elmo, on which are a powerful fort and a light-house. From this Point to its landward end, the neck of land, named the 'Hog's Back,' rises gradually; and there is a downward slope from the central ridge to the Great Harbor on the right, and to the Marsa-Musceit, the quarantine harbor, on the left. Eight principal streets traverse the peninsula, and are intersected by cross streets that pass over the central ridge, and afford communication from harbor to harbor. These cross-streets are necessarily very steep at the extremities, where they rise from the shores by long flights of stairs. The town and harbors are defended by a series of fortifications of great strength. They are mostly hewn out of the solid rock, and, mounted with the most powerful artillery, are considered impregnable. The city is divided into five parts—the *Citta Nuova*, or Veletta proper, Floriana, Vittoriosa, Sanglea, and Barmola. Besides the enormous forts, balconies, and battlements, which are the principal architectural characteristics of the city, Valetta contains many noble edifices. The governor's palace—formerly that of the grand masters of the order of St. John—is plain without, but magnificent within, and possesses an interesting armory; the Cathedral of St. John is a superb structure; and the Church of San Pubblio, with its famed *sotteraneo* (vault) of embalmed monks and skeletons; the public library, 60,000 vols.; the university; and the aqueduct, which brings water to the city 8¾ m. from the far side of the island, are noteworthy. The city was founded 1566 by the grand master Valette (q.v.)—from whom it derives its name. Valetta is the center of the commerce of the island, for which, as well as for the principal historical incidents with which its name is associated, see MALTA. Pop. 61,268.

VALETTE, *vâ-lĕt'*, JOHN PARISOT DE LA, *dĕh lâ pâ-re-zō':* grand master of the Knights of St. John, celebrated for his gallant defense of Malta against a powerful fleet of the Turks, by which he greatly aided in

checking the westward progress of the arms of Solyman the Great, long the terror of Europe and of Christendom: 1494-1568, Aug. 21; of noble family. At a very early age he entered the order of St. John of Jerusalem (q.v.), in which he soon distinguished himself by enthusiastic bravery and skill in arms. His chief distinctions, even in youth, were won in the naval service in the Mediterranean, where the Turkish power was especially formidable. On the death of Claude la Sangle, grand master of the order, La Valette was elected to that office, 48th in the list of the grand masters. Still directing the energies of the order in the same course, he succeeded, within the first five years of his grandmastership, in capturing 50 great galleys from the Turks, and an immense number of smaller vessels of war; which stirred the sultan to attempt the capture of Malta and the destruction of the knights. Accordingly, 1565, May 18, an immense fleet of 159 ships, conveying 30,000 janizaries and spahis, appeared off the harbor of Malta, and, after failing in several assaults, formally invested the island. Alone and unsupported by any of the Christian powers, the gallant La Valette held the fortress under circumstances of extreme difficulty and distress of every kind; and when, all further resistance seeming hopeless, he was urged to capitulate, his reply was, that the life of a worn-out soldier of 71 years could not be better spent than in such a service. At last, at the end of four months, and after a loss, it is said, of 20,000 men, the Turkish fleet was forced to raise the blockade and retire. La Valette died three years later.

Another La Valette, a father of the Jesuit Society, obtained notoriety in the latter half of the 18th c. Having engaged, contrary to the prohibition of Benedict XIV., as a trader in the products of the large estates held by the Jesuits in the Philippine Islands, and being unable, in consequence of the capture of his ships by an English privateer, to meet his engagements, a suit was commenced in the French courts against the French province of the society, the proceedings in which suit were among the causes which precipitated the expulsion of the society from France, and its eventual suppression by Clement XIV. See Jesuits.

VALETUDINARIAN, n. *văl'ĕ-tū'dĭ-nā'rĭ-ăn* [L. *valetudĭnārĭus*, one in ill health—from *valetūdo*, state of health—from *valērĕ*, to be well: It. *valetudinario:* F. *valétudinaire*]: a person of weak or sickly constitution: Adj. sickly; seeking to recover health. Val'etu'dina'rianism, n. *-ĭzm*, state of being a valetudinarian; ill health. Val'etu'dinary, n. a. *-dĭ-nĕr-ĭ*, valetudinarian.

VALGUS, *văl'gŭs:* in surgery, a variety of Club-foot (q.v.). The word is Latin and signifies 'having legs bent outward, bow-legged,' probably from *volvo*, 'to turn or twist.' As it is an adjective, the substantive *Talipes* (an

unclassical word, meaning 'weakness of the feet,' but in surgical use 'club-foot') must be understood.

VALHALLA, n. *văl-hăl'lă* [Icel. *valhöll,* hall of the slain—from *valr,* slaughter, and *höll,* a hall]: in *Scand. myth.,* literally, 'the Hall of the Slain,' the palace or hall of immortality inhabited by the souls of heroes slain in battle. See WALHALLA; WALKYRIES.

VALIANT, a. *văl'yănt* [F. *vaillant,* courageous; *valoir,* to be worth—from L. *valērĕ,* to be strong]: brave; courageous; intrepid in danger; heroic; bravely performed. VAL'IANTLY, ad. *-lĭ.* VAL'IANTNESS, n. *-yănt-nĕs,* valor. VALIANCE, n. *văl'yăns,* or VAL'IANCY, n. *-ĭ,* in *OE.,* valor; personal bravery; fierceness. VALIANTS, n. plu. *văl'yănts,* in *OE.,* strong men; valiant men; heroes.

VALID, a. *văl'ĭd* [F. *valide*—from L. *valĭdus,* strong, stout—from *valērĕ,* to be strong: It. *valido*]: founded in truth; not weak or defective; efficacious; having legal force; just; sound; executed with the proper formalities; in *OE.,* strong; powerful. VAL'IDLY, ad. *-lĭ.* VAL'IDNESS, n. *-nĕs,* validity. VALIDITY, n. *vă-lĭd'ĭ-tĭ,* soundness; legal strength or force; in *OE.,* strength; value. VALIDATE, v. *văl'ĭ-dāt,* to make valid or sound; to acknowledge as true. —SYN. of 'valid': available; efficacious; good; weighty; just; sufficient.

VALISE, n. *vă-lēs'* [F. *valise*—from It. *valigia:* origin unknown]: a leather receptacle for the clothes, toilet articles, etc., of a traveler; traveling-bag; portmanteau; saddle-bag used by horse-artillery.

VALKYR, n. *vâl'kĭr,* or VALKYR'IA, n. *-ĭ-a* [Icel. *valkyrja*—from *valkr,* the slain]: in *Scandinavian Mythology* (q.v.), one of the 12 nymphs of Valhalla. See WALKYRIES; WALHALLA.

VALLA, *vâl'lâ,* LAURENTIUS: one of the first scholars of the Renaissance: about 1406-57; b. Rome. He taught classics in n. Italy; but his assaults on the scholastic philosophy, and his defense of Epicurus, made it necessary for him to seek protection at Naples from Alfonso V., 1443. Here he soon fell under suspicion of heresy, and was, it is said, dragged for punishment before the Inquisition. Aided by the king, he escaped to Rome, where Pope Nicholas V. pardoned him, received him into favor, and appointed him papal secretary and canon in the Church of St. John Lateran. Valla's Latin translations of Herodotus (Par. 1510) and Thucydides (Lyon, 1543) are admirable, and did much to spread a knowledge of history; but his most renowned work was *Elegantiæ Latini Sermonis* (6 books, Rome, 1471), long a model in style to Latinists: 59 eds. of it appeared 1471-1536. It has passages of noble eloquence in praise of the glorious tongue of Rome, through which gleams a passionate desire for the unity of Italy. The *Elegantiæ* is full of nice grammatical observations, particularly on synonyms. Valla has the credit also of being the first of the Renaissance

scholars that used his classical culture in the New Testament criticism (*Annotationes in Novum Testamentum*, published by Erasmus). In his *De Donatione Constantini Magni*, he demonstrated the historical groundlessness of the pretended 'Donation' of Constantine, and inveighed against the popes for grasping after temporal power; but this he was forced to retract. A collected edition of Valla's works appeared at Basel 1543.

VALLADOLID, *vâl-la-dō-lĭd'*, Sp. *vâl-yâ-thō-lēth':* former name of a town in Mexico, capital of the state of Michoacan, and now called MORELIA (q.v.).

VALLADOLID': town in Mexico, state of Yucatan; 90 m. e.s.e. of Merida, in a highly cultivated district. It is the best-constructed and most healthful town in Yucatan, and the seat of cotton manufactures. Pop. about 18,470.

VALLADOLID: city of Spain: formerly capital of the whole country, now capital of the province of Valladolid (see CASTILE); on a wide, windy plain on the left bank of the Pisuerga, 150 m. n.w. of Madrid by railway. It is 2,250 ft. above sea-level, and has a healthful climate, the air being pure and genial, and the sky generally cloudless. Having been the residence of the court prior to its removal to Madrid at the close of the 16th c., the city contains many large and decayed dwellings; though, with returning prosperity, new mansions have been erected, and the streets paved, enlarged, and multiplied. In the Plaza de Campo, site of famous tournaments, *autos-da-fé*, decapitations, and bull-fights, Napoleon reviewed 35,000 troops. The Plaza de Toros, or bull-arena, can accommodate 10,000 persons. The Museo, which contains such of the statues, carvings, and sculptures as could be collected at the suppression of convents in the province, is an elegant building, containing a grand saloon, six rooms filled with pictures, and three with sculptures. Of these treasures, the sculptures are the most valuable, though among the pictures are several by Rubens. Near the Palacio Real (royal palace) are the remains of two of the noblest Gothic religious edifices in the world, the Convent of San Pablo and the Colegio de San Gregorio, both richly and beautifully decorated, but much damaged by the French soldiery. Valladolid is admirably situated for trade and manufactures. There is abundant water for irrigation, and the surrounding district is remarkably fertile. It communicates with the Atlantic by the Douro river, and with middle and s. Spain by canals and railways. Manufactures are springing up in the city: and the soil in the vicinity is being improved. Silk, cotton, and woolen stuffs, jewelry, hats, paper, perfumery, etc., are manufactured. Pop. (1900) 68,790.

Valladolid, the *Pincia* of Ptolemy, is mentioned under its present name first in 1072. Charles V. erected many splendid edifices here. About that time, Valladolid was the most prosperous city in Spain, containing 100,000

inhabitants: formerly capital of Castile and Leon, it was still the residence of the kings and the usual resort of foreigners. From 1560, when Madrid was declared the only court, Valladolid declined. Since 1851 it has been the seat of an archbishop, and has still its university.

VALLADOLID' LA NUE'VA (city in Honduras). See COMAYAGUA.

VALLADOLID: Philippines; pueblo, province of Negros Occidental; on the w. coast on Guimaras strait, 16 m. s. of Bacólod. Pop. 14,000.

VALLANDIGHAM, CLEMENT LAIRD: American politician: b. New Lisbon, Ohio, 1820, July 29; d. Hamilton, Ohio, 1871, June 17. He was educated at Jefferson College, Pa.; taught school in Maryland two years, studied law, and was admitted to the bar in 1842, Dec. More inclined to a political than legal career, at 25 he became the representative of Columbiana co. in the legislature of Ohio, the youngest member then on the roll. In 1847 he removed to Dayton, Ohio, which he made his permanent home, and took charge of *The Empire*, a Democratic newspaper, which he edited with marked ability for two years. Entering congress in 1856, he at once became prominent, and opposed the war as unnecessary and unconstitutional, and his opposition was without moderation or restraint.

Failing of election to congress in 1863, he returned to Ohio, and at political meetings opposed and denounced the government, and the war policy in such bitter terms, that he became the most prominent leader of the so-called 'Copperheads' of the North. His extreme opposition to the war led to his arrest in 1863, May, at Dayton, by General Burnside, commanding the military department of the Ohio. He was tried by a military commission at Cincinnati, Ohio, for disloyal utterances and conduct, found guilty, and sentenced to close confinement during the war, but President Lincoln commuted the sentence to banishment beyond the Federal lines, and he was sent s. through General Rosecrans' camp at Murfreesboro into the Confederate lines. Being unwilling to espouse the cause of the Confederacy and dissatisfied with his reception in the South, in a short time he ran the blockade from Wilmington, N. C., and proceeded by sea to Halifax, and later to Windsor, Canada, where he made his home for a time. While at Windsor he was nominated by the Democrats of Ohio for governor, against the Hon. John Brough, and was defeated by over 100,000 majority. In 1864 he returned to his home at Dayton without molestation, and took an active part in various political campaigns in Ohio, becoming a delegate to the National Democratic Convention at Chicago.

His tragic death occurred while he was engaged as attorney in an important murder case. He was illustrating to the jury the manner in which the victim was shot, when by accident he fatally shot himself with the pistol

he held in his hands. Vallandigham was an accomplished and forcible speaker. His style was formed from the best models of oratory. His convictions were strong and inflexible, his integrity and courage undoubted.

VALLARY CROWN, *văl'lâ-rĭ* [L. *corona vallaris* or *castrensis*]: crown in the form of a circle of gold, with palisades attached, bestowed by the ancient Romans on the soldier who first surmounted hostile outworks and broke into the enemy's camp. It is occasionally used as a heraldic bearing.

VALLATION, n. *văl-lā'shŭn* [L. *vallum*, a rampart]: in *OE.*, a rampart or intrenchment.

VALLECULA, n. *văl-lĕk'ū-la* [dim. of L. *vallis*, a valley]: in *bot.*, a depressed space or interval between the ribs on the fruit of Umbelliferæ.

VALLEJO, *văl-lā'hō:* city and seaport in Solano co., Cal.; on San Pablo Bay, at the mouth of Napa creek, and on the Central Pacific railroad; 27 m. n.n.e. of San Francisco. It has a commodious, safe, and accessible harbor, capable of receiving the largest vessels, and is directly opposite the U. S. navy-yard at Mare Island. The region is agricultural, and the city exports large quantities of grain. Other industries are the manufactures of flour, steam-engines, boilers, foundry products, brooms, and ship-building. There are gas and electric light plants, water-works, street railroad, numerous churches, high school, several grammar schools, academy for young ladies, convent, orphan asylum, banks, and daily and weekly newspapers. Pop. (1910) 11,340.

VALLEY, n. *val'lĭ*, VAL'LEYS, n. plu. *-lĭz* [F. *vallée*—from L. *vallis*, a valley: It. *valle*]: a tract of land of greater or less breadth lying between a range of hills or mountains; a low plain through which a river flows: in *arch.*, the gutter or internal angle formed by the two inclined sides of a roof. VALE, n. *vāl*, a poetic form of *valley.—Valleys* are generally parallel to the direction of the ridges of elevated ground; but some valleys are transverse, cutting through the mountain chain. They have a water-course at or near their lowest level. Through the main valley flows the river of the drainage-system to which it belongs, while the tributary streams flow to this river through lateral valleys. The terms upper and lower valley define parts of the same valley, as related to the source or to the mouth of its river. In wide valleys, especially those in which the waters are largely charged with sediment, the river often builds up a channel for itself, higher than the ground at the foot of the hills: the Rhine, the Nile, and almost all great rivers in wide valleys illustrate this. The river flows seldom through the middle of the valley, but generally nearest that side where the slope to the high ground is steepest; the opposite side of the main valley, presenting a more gradual rise to the mountain summits, supplies the chief lateral valleys and tributary streams.

Internal force must have been a principal agent in producing the diversity of hill and valley: it acted by raising the surface perpendicularly from below; by producing great faults, which presented facilities for the action of running water; or by pushing a portion of the crust forward, so as to produce immense folds, alternating with mountain ranges. The Appalachians of North America, and their associated valleys, have been produced, as shown by Prof. Rogers, by the last-mentioned method. In other cases, valleys have been produced by the plowing of glaciers in the glacial period, or by atmospheric erosion acting on soft material. In the case of river-cuts through mountains, the adjacent region was filled with strata (afterward removed) when the process of cutting by the river began; and in some instances there was an elevation that kept pace with the work of cutting, the river acting as a saw on material pressed upward.

VALLEY CITY: N. D.; city, county-seat of Barnes co.; on the Cheyenne river, and on the Union Pacific and the Minneapolis, St. P. & S. Ste. M. railroads; about 55 m. w. of Fargo. It is in an agricultural and stock-raising region. The industries are connected chiefly with farm products and the shipment of live-stock, and the city is a distributing center for quite an extensive region. The educational institutions are the State Normal School, public graded schools, and a school library. The two banks have a combined capital of $75,000 and deposits amounting to $519,690. Pop. (1910 est.) 2,681.

VALLEY FALLS: Kan.; city in Jefferson co.; on the Kansas City N., the Union P., and the Atchison, T. & S. F. railroads; about 30 m. w. of Leavenworth and 26 m. n. of Topeka. It is in a fertile agricultural region. The river furnishes excellent water-power, and the chief manufactories are flour-mills, machine shop, and agricultural implement shop. There are two state banks. Pop. 1,300.

VALLEY FORGE: Pa.; village in Chester co.; on the Schuylkill river, and on the Philadelphia & R. railroad; 24 m. w. of Philadelphia. Valley Forge is noted as the place where Washington and his army of about 11,000 men went into winter quarters, 1777, Dec. 17, after the occupancy of Philadelphia by the British. The army suffered cold and hunger on account of the poverty of the country, but perhaps more from the incompetency of the commissary department. Despite the consequent illness of many of the men, Baron Steuben, who had been made inspector-general of the army, drilled and trained the soldiers and reorganized the army. Washington was at Valley Forge when he received the news of the consummation of the alliance with France. Washington abandoned the camp 1778, June 18, and again took possession of Philadelphia.

In 1893 the Pennsylvania legislature took steps to

acquire and preserve Valley Forge as a public park and historic landmark. On Oct. 19, 1901, a monument was here unveiled by the Daughters of the Revolution in memory of the soldiers who died in camp during the winter of 1777-8. The entire field at Valley Forge is practically the same today as it was when evacuated by Washington in 1778. The trenches thrown up by the 'ragged Continentals' may still be seen. The old stone house which Washington used for his headquarters is standing and is in a good state of preservation. In 1903 the matter of making Valley Forge a state park was again taken up by the legislature of Pennsylvania, and the sum of $74,500 was appropriated for the purpose. To the 210 acres already owned by the state 800 acres were added.

VALLEY QUAIL. See QUAIL.

VALLEYFIELD, or SALAHERRY DE VALLEYFIELD: Canada; a town and port of entry in Beauharnois co., on the Saint Lawrence river, and at the head of Beauharnois canal constructed past the Saint Lawrence rapids, 30 m. by the Grand Trunk railway s.w. of Montreal. The river here is crossed by a splendid railway bridge. Valleyfield is the see of a Roman Catholic bishop, and has a cathedral, college, and other fine public institutions. The town is electrically lighted, has abundant water power, waterworks, and flouring-, paper-, and cotton-mills, one of the latter establishments employing 1,500 persons. Pop. (1901) 11,055.

VALLIC'ULA. See VALLECULA.

VALLISNERIA, *văl-ĭs-nē'rĭ-â:* genus of small, stemless, aquatic plants, with grass-like leaves, belonging to the nat. order *Hydrocharideæ,* found in the warm parts of both hemispheres, and generally growing in running waters. *V. spiralis* is particularly notable for its peculiar process of fecundation. When this is about to take place, the flowers of the female plants rise to the surface of the water by means of their long spirally twisted stalks: the flowers of the male plants, which grow on short spikes at the bottom of the water, in order to follow them thither, become detached, expand, and float about on the surface. After fecundation, the female flowers return under water by the spiral contraction of their stalks, and the fruit is ripened under water. This plant is found in ditches and ponds in Europe and America. It is one of the plants used under the microscope to exhibit rotation (cyclosis) of protoplasm in the living vegetable cell.

VALLOMBROSA, *văl-om-brō'sâ* ('Shady Valley'): celebrated abbey of Tuscany; among the Apennines, 15 m. e. of Florence, in a valley surrounded with forests of fir, beech, and chestnut trees (hence the name). Here an order of monks following the rule of St. Benedict was founded by John Gualbert 1039. They were called Vallombrosians, from the name of the site, or Gray Monks,

from the color of their habit, which, however, was afterward changed to black. They were the first to admit lay brethren. The monastery became very wealthy through donations. The present magnificent buildings, erected 1639, are now used for a royal academy of forestry, the monastery having been suppressed 1863. This picturesque scene was visited by Dante, was celebrated by Ariosto in the *Orlando Furioso,* canto xxii., and is mentioned by Milton in the *Paradise Lost.* It is still much visited by artists and tourists.

VALMY, *vâl-mē':* village of France, department of Marne; 20 m. n.e. from Chalons. In 1792 the Prussians, under the Duke of Brunswick, after capturing Longwy and Verdun, were advancing toward Paris, driving the army of Dumouriez before them, when Kellermann (q.v.), who commanded the army of the Rhine, learning the critical situation of his comrade, hastened to his relief with 22,000 men, and, taking position on the heights of Valmy, awaited the advance of the Prussians. These, possessing themselves of the heights of La Lune, immediately opened a vigorous cannonade on the French, to which the latter effectively replied. The explosion of two ammunition-wagons within the French lines having thrown them into disorder, a body of Prussians advanced to the attack; but the energetic conduct of Kellermann, and the enthusiasm infused by him into his troops, restored their steadiness, and, by a sudden charge with the bayonet, the Prussians were driven back to their former position. This battle, or rather skirmish, frequently alluded to as the *cannonade of Valmy,* did not cost either army more than 800 men, but it produced moral effects of great importance. It was the first triumph of the republican arms, and the French, with characteristic impulsiveness, were raised from the depths of despair to the pinnacle of self-confidence. When Napoleon was creating his 'noblesse,' this great service rendered to France by Kellermann was fully remembered by his nomination as *Duc de Valmy.*

VALOIS, *vâ-lwâ',* House of: branch of the Capetian Dynasty (q.v.), which possessed the throne of France 1327-1589. It originated in the person of Charles, second son of King Philippe III. (*le Hardi*), who obtained 1285 the county of Valois in appanage from his father. Previously the county had been possessed by a cadet branch of the great House of Vermandois; but after the union of the heiress of Vermandois with Count Hugh the Great, younger son of King Henry I., and on the failure of their descendants in the end of the 12th c., the Vermandois possessions, including Valois, were annexed to the French crown, till again separated 1285, as above mentioned. But Philippe IV., elder brother of Charles, having left three sons, who reigned in succession and died without issue male, the succession fell, by the Salic law, to the eldest son of Charles, who accordingly ascended

the throne as PHILIPPE VI. (q.v.). The elevation of the House of Valois to the throne of France gave rise to long and bloody wars with Edward III. of England, who claimed the crown through his mother, Isabel, daughter of Philippe IV., insisting that the Salic law prohibited only the 'succession' of females, and did not deny their capacity for transmitting a claim to the crown. But if Edward III.'s argument had been sound, it would have destroyed his rival's claim without benefiting himself, for the real heirs to the throne would have then been the Navarrese royal family, as descendants from the eldest daughter of Louis X. Edward, nevertheless, assumed the title *King of France* (an example followed by all his successors till George III.), and maintained his claim by force of arms till, by mediation of the pope, a partition of the kingdom was effected. The French crown fell, by regular succession of son to father, to JOHN THE GOOD (reigned 1350-64), CHARLES V. (1364-80), CHARLES VI. (1380-1422), CHARLES VII. (1422-61), LOUIS XI. (1461-83), and CHARLES VIII. (1483-98), under the first four of whom the contest with England was carried on with spirit, at first to the advantage of the English, but latterly of the French, who, under Charles VII., drove the English from all their strongholds except Calais. Charles VIII. having died without male issue, the crown fell to the representative of the nearest collateral male line—i.e., to Louis, son of Charles, Duke of Orleans, and grandson of Louis, Duke of Orleans, the younger brother of Charles VI., who ascended the throne as LOUIS XII. (1498-1515), the first of the Valois-Orleans *régime;* but he also dying without male issue, the succession devolved on the descendants of his uncle, Count Jean of Angoulême, whose grandson, FRANCIS I. (1515-47), next obtained the sceptre, which he transmitted to his son HENRY II. (1547-59). Henry's three sons, FRANCIS II. (1559-60), CHARLES IX. (1560-74), and HENRY III. (1574-89), occupied the throne in succession; but none of them leaving lawful male heirs, and all the collateral male lines proceeding from Philippe III. having become extinct, the crown passed to the House of Bourbon (q.v.), descendants of Philippe's younger brother, Robert.

The most distinguished cadet branches of the royal line of Valois were: the ducal family of Anjou, which long contested with the Aragonese royal family the possession of Naples; the last and most celebrated ducal House of Burgundy; and the illegitimate line of Dunois and Longueville, productive of eminent warriors and daring politicians.

The Valois monarchs of the elder line were a succession of able rulers, who, by valor and policy, wrested France from the hands of the English, and firmly established the royal authority over their powerful, proud, and turbulent nobility; those of the younger, or *Valois-Orleans* and *Valois-Orleans-Angoulême* lines were, except Francis I., a series of weak princes, under whose feeble

rule the country was distracted by contests for power between rival nobles, and religious dissensions among the people at large, though, owing to the number of able men on whom devolved the cares of government, the country suffered less than might have been expected from the incapacity of its monarchs.

VALONIA, n. *vă-lō'nĭ-ă* [It. *vallonea*—from mod. Gr. *balanĭa*, the holm or scarlet oak—from Gr. *balănos*, an acorn]: the acorn-cups of an oak growing in Turkey, Greece, and other countries bordering on the Levant, much used by dyers and tanners, from the abundance of tannin which it contains; the acorn of the *Quercus æ'gilops*, ord. *Cupulif'èræ*.

VALOR, n. *văl'ėr* [F. *valeur*, value, valor—from mid. L. *valor* or *valōrem*, activity, warlike valor—from L. *valērĕ*, to be strong: It. *valore*, value, bravery]: that quality of mind which enables a person to encounter danger with firmness and resolution; personal bravery; courage. VAL'OROUS, a. *-ŭs*, brave; courageous; stout-hearted. VAL'OROUSLY, ad. *-lĭ*.—SYN. of 'valor': heroism; bravery; gallantry; intrepidity; prowess; fearlessness; boldness.

VALOREM, used only in the phrase AD VALOREM, *ăd vă-lō'rĕm* [L. *ad*, to; mid. L. *valōrem*, profits received from goods, value]: according to the value; in *commerce*, applied to customs duties levied on the value of the dutiable commodity—as distinguished from *specific duties*, levied as so much per piece, yard, pound, barrel, ton, or the like.

VALPARAISO, *vâl-pâ-rī'sō:* city, capital of Porter co., Ind.; on the Chicago & Grand Trunk, the New York, Chicago & St. Louis, and the Pittsburg, Fort Wayne & Chicago railroads; 44 m. s.e. of Chicago. It was settled in 1836 and in 1856 was incorporated. It is in a fertile agricultural section, and has a large trade in farm products. The chief manufactures are mica paint, dairy products, and machine shop products. The city is famous for its large school called the Northern Indiana Normal School, and known also as Valparaiso College, a great institution founded by Henry Brown. Its courses of study are planned to meet the needs of a large number of men and women who do not find the regular college courses available. There are about 4,000 pupils enrolled, and the regular faculty numbers 36, but there is a large number of special instructors. There are two national and one state bank, having a combined capital of $185,000, and deposits amounting to $987,190. The government is vested in a mayor, who holds office four years, and a common council. Pop. (1910) 6,987.

VALPARAI'SO: city of Chili, South America; capital of the province of Valparaiso; about 70 m. w.n.w. of Santiago (q.v.), but 115 by rail; lat. 33° 0′ 2″ s., long. 71° 41′ 15″ w. It is on a narrow strip of land, at the head of the Bay of Valparaiso. It contains theatres, colleges, hospitals, and a number of scientific and literary

institutions; its streets, though narrow, are well paved; and its houses, generally two stories high, are gayly painted, and furnished with balconies. Valparaiso is the most important trading town of Chili, and one of the principal commercial ports on the w. coast of South America. It has a growing commerce. The Bay of Valparaiso, which is generally thronged with ships, is sheltered from all quarters except the n.; and in the winter months, when n. gales prevail, the anchorage is considered dangerous. In 1822 the town was nearly destroyed by an earthquake; and its progress has since been repeatedly checked by the same cause. Fifteen forts, mostly new, defend the bay. More than 1,500 vessels enter the port annually. Foreign trade is chiefly with Great Britain, France, Germany, and the United States. Imports, value about $17,000,000, are chiefly cotton, silk, and woolen goods, hardware, iron, sugar, wines, spirits, tobacco, etc.; exports, value about $9,000,000, are chiefly copper and copper ore, silver, gold, wheat, flour, tallow, hides, and wool. Valparaiso was bombarded by the Spanish fleet 1866, Mar. 31. Few lives were lost, but a large part of the town was laid in ruins—the damage being estimated at more than $10,000,000. In the revolution against President Balmaceda, 1891, severe fighting occurred before Valparaiso Aug. 21-23, in which the revolutionists were successful. The city was occupied the 28th, and the president fled Aug. 31. A mob which started fires and rioting was soon suppressed. On Oct. 16 an attack was made by Chilians on a number of sailors from the U. S. warship *Baltimore* on shore leave, in which several sailors were killed and many wounded. The incident produced great excitement in the United States. The government made prompt demand for reparation, and began energetic naval preparations to enforce the demand. War was averted by Chili making an ample apology to the United States 1892, Jan. Pop. (1901) 132,940.

VALTELLINA, *vâl-tĕl-lē'nâ:* valley of Lombardy, bounded n. by the Grisons, n.e. by Tyrol, s. by the provinces Brescia, Bergamo, Como, w. by Lake Como: it is now the province of Sondrio (1,261 sq.m.) in the *compartimento* of Lombardy. It is a very fertile region, producing wine, grain, fruits, and cheese. The capital of the province is Sondrio; other towns are Teglio, Tiramo, Chiavenna, Bormio, Grosotto.

VALUE, n. *văl'ū* [OF. *value*, value—from F. *valoir*, to be worth—from L. *valērĕ*, to be strong, to be worth]: worth as estimated by some rate or standard; that property of a thing which renders it useful or desirable; excellence; usefulness; price; import; efficacy in producing results; in *OE.*, valor: V. to rate or estimate at a certain price; to have in high esteem; to prize; in *OE.*. to be worth, to be equal in worth to. VAL'UING, imp. VAL'UED, pp. *-ūd;* ADJ. estimated at a certain rate; highly es-

teemed. VAL'UABLE, a. *-ū-ă-bl,* having value or worth; precious; costly: N. anything precious or costly—used in plural. VAL'UABLENESS, n. *-bl-nĕs,* the quality of being valuable. VAL'UA'TION, n. *-ā'shŭn,* the act of setting a price; value set upon a thing; estimation. VAL'UATOR, n. *-ā-tėr,* one whose occupation is to set the value or worth on a thing; an appraiser; also VAL'UER, n. *-ėr.* VAL'UELESS, a. *-lĕs,* having no worth.—SYN. of 'value, v.': to compute; rate; esteem; regard; respect; appraise; appreciate; estimate.—*Value* in political economy is the amount of other commodities, usually represented by the current money of the place, for which a thing can be exchanged in open market. This is called 'value in exchange,' as distinguished from mere 'utility' or 'usefulness,' usually styled 'value in use.' Value in exchange is determined by utility or usefulness—the capacity of satisfying a desire or of serving some purpose; it is determined also by scarcity, difficulty of attainment, labor or skill employed in producing the commodity, etc.

Cost has nothing to do with value. If a bale of silk has cost $500, and from disease in the silk-worm, or other causes, the price of the commodity rises so that it will bring $750, that is its value. So also if there be a fall so that it will only bring $300, that is its value. Vain endeavors have been made to establish a permanent standard of value for the purpose of comparing with each other the conditions of people living at long intervals. As the changes which affect one thing affect all others, comparisons resolve themselves into the nature of fluxions. Money, so effective in estimating contemporary values, is quite useless here. In certain periods, grain, as the necessary of life, has been used as a standard of value. It may be an approximate standard while a people are so poor as to possess little more than the necessaries of life; but when a country becomes so rich that these are but a proportion of the wealth to be estimated, their capacity as a standard is gone.

VALVE, n. *vălv* [F. *valve,* a valve—from L. *valvæ,* folding-doors—allied to *volvo,* I roll]: a cover or lid opening in one direction and shutting in another; a self-acting device used in a pipe, tube, passage-way, inlet, or outlet, to control the flow of a fluid, a gas, or the like—e.g., the *valves* of the heart, the *valve* of a pump, of an organ, etc. (see STEAM-ENGINE); in *bot.,* one of the pieces into which a pericarp or fruit separates, when separating naturally; in *anat.,* a partition which allows a fluid to pass in one direction only; in *OE.,* one of the leaves of a folding-door. VALVATE, a. *văl'vāt,* in *bot.,* opening by valves, like the parts of certain seed-vessels which separate at the edges of the carpels. VALVATE ÆSTIVATION or VERNATION, in *bot.,* terms used when the leaves in the flower-bud and leaf-bud are applied to each other by their margins only. VALVED, a. *vălvd,* having valves; composed of valves. VALVULAR, a. *văl'vū-lėr,*

containing valves. VAL'VULE, n. *-vūl*, a little valve. SAFETY-VALVE. See under SAFE.

VALVE BOX: the box or casing which contains the valves of pumps. Also the steam chest which contains the slide valve of an engine. VALVE CASING, the shell of a valve. A valve box. VALVE CHAMBER, a valve box. The term is usually applied, however, to a steam chest rather than to an ordinary valve box. VALVE CIRCLE, the circle on a valve diagram, the diameter of which is equal to one-half the travel of the valve. A valve diagram has two such circles. VALVE COCK, a cock which is operated by a lift, slide, or other form of valve, instead of a plug. A globe valve is a valve cock. VALVE DIAGRAM, a diagram by which the position of the slide valve for any position of the piston, or the position of the piston for any position of the valve, may be determined graphically. Therefore, the relative positions of the valve and piston at the instants of opening, cut-off, cushioning, and release, may be accurately determined. There are various methods of constructing valve diagrams. The most familiar are the polar method, Reuleux's method, and Zeuner's method, the last named being the simplest method of all. VALVE FACE, the face on or against which a slide valve moves, as distinguished from a valve seat. VALVE GEAR, the mechanical arrangements for actuating slide valves, both for single and reversing action, consisting of slot links, rods, and expansion devices, automatic or otherwise. VALVE PLATES, cut-off valve. VALVE RING, an equilibrium ring. VALVE ROD or VALVE SPINDLE, the rod which passes through the stuffing box in the steam chest, and is attached to the slide valve and through which the valve is actuated from the eccentric. VALVE ROD GLAND, the small casting which closes the stuffing box of the rod of a slide valve, and maintains the rod steam tight. VALVE SECTOR, a slot link or a quadrant. Also specifically applied to the vertical sliding link of an oscillating cylinder engine, by which the motion of the eccentric is communicated to the valve rod weigh-shaft. VALVE SPRING, a plated or spiral spring used for pressing the packing or equilibrium rings of slide valves against their faces. VALVE STEM, a valve rod or spindle. VALVE-YOKES, the wrought-iron or steel bands placed around the slide-valves in the steam-chests, and to which the valve-stems are attached.

VAMBÉRY, *vâm'bā-re*, ARMINIUS: traveler and philologist: b. in Hungary, 1832. He fled from his country after the revolution of 1848, and went to Constantinople, where he applied himself to studying oriental languages. In 1861-64 he traveled in the disguise of a dervish, by routes unknown to Europeans, through the deserts of the Oxus to Khiva, and thence by Bokhara to Samarkand. His position precluded him from making instrumental observations for purposes of geography, but was eminently favorable to an insight into the customs and lan-

guage of the peoples; hence his *Travels and Adventures in Central Asia* (London, 1864) is a very valuable work. His other publications are: *Wanderings and Adventures in Persia* (1867); *Sketches of Central Asia* (1868); *History of Bokhara* (1873); *Central Asia* (1874); *The Origin of the Magyars* (1882); *Vambery: His Life and Adventures* (1883); and *The Coming Struggle for India* (1885). Vambery is oriental professor at Pesth.

VAMBRACE, n. *văm'brās* [F. *avant*, before; *bras*, arm]: a piece of plate-armor worn for the protection of the fore-arm. VAMPLATE, n. *văm'plāt*, or VAM'PLET, n. *-plĕt* [F. *avant*, before; *plat*, a plate]: a projecting piece of iron through which the handle of a lance passed, and which served to protect the arm and hand when the lance was couched as in jousting.

VAMP, n. *vămp* [OE. *campey*, a corruption of F. *avantpied*, the forepart of the foot—from *avant*, before; *pied*, the foot]. the upper leather of a shoe; anything added to give an old thing a new appearance: V. to put a new upper leather on; to furbish, generally with *up;* in *music*, to play an accompaniment on any instrument off-hand or in a rough-and-ready way: N. a rough accompaniment on an instrument improvised for the occasion. VAMP'ER, n. *-ĕr*, one who pieces out an old thing with some new part.

VAMPIRE, n. *văm'pīr* [F. *vampire;* It. *vampiro;* Ger. *vampyr*, a vampire: Serv. *wampir, wampira*, a vampire]: an imaginary demon, said to be a person who after death returns nightly to suck the blood of the living while they are asleep; hence, one who lives by preying on others; an extortioner; a species of South American bat, the Vampire-bat (q.v.). VAM'PIRISM, n. *-pĭr-ĭzm*, the actions of a vampire; the practice of blood-sucking or extortion; belief in vampires.—*Vampires*, according to the popular belief of the Slavonic, Romanic, and Greek population of the lower Danube and the Thessalian peninsula, are blood-sucking ghosts. In the mythology of the ancient Greeks, beings of similar nature—the Lamias—were beautiful phantom women who by voluptuous delusions allured youths to them in order to feast on their young, pure blood and flesh. And among Slavonic races (e.g., in White Russia, the Ukraine, Poland, Servia, Slavic Bohemia, etc.) there is a superstition that the bodies of those who have died in excommunication by the church are kept by the devil in a kind of life; that they go forth from their graves by night and suddenly destroy other men, and by other means procure food, and thus supply themselves with sustenance. They are called Burkolakkä or Tympanitä; and the only way of escaping from molestation by them is by digging up their unwashed corpses and burning them, after the removal of the excommunication. The vampire proper is the illegitimate offspring of parents themselves illegitimate, or the troubled spirit of one killed by a vampire. By night,

especially at full moon, he comes out of his grave, and wanders about in the form of a dog, frog, toad, cat, flea, louse, spider, etc., and sucks the blood from living persons by biting them in the back or neck. If a dead person is under suspicion of being a vampire, his body is disinterred: if putrid, it is sprinkled with holy water; but if red and bloody, the devil is first exorcised by the priest, and a stake driven through the breast, or a nail through the forehead, when the body is reinterred. The Vukodlaks of the Servians are particularly fond of the blood of young girls. They pair with the Wjeschtitza, female ghosts with wings of fire, which by night sink down on the breast of sleeping soldiers, and inspire them with their fury. As any one killed by a vampire becomes himself a vampire, when a Wallachian dies, where this superstition prevails, a skilled person, generally a midwife, is always called in, to take precautions against the corpse becoming a vampire, as by driving a nail through the skull, rubbing in various places with the lard of a pig killed on St. Ignatius's Day, etc. Sometimes the vampire is thought to be the soul of a living man, which leaves his body in sleep and is blown in the form of chaff or down, and sucks the blood of other sleepers. The *ghoul* of the Arabs and Persians seems identical with the vampire.—For an account of writings in Germany on this subject, see Rauft's *Treatise on the True Nature of the Hungarian Vampire* (Leip., 1734).

VAMPIRE-BAT: blood-sucking bat of South America, belonging to the genus *Desmodus*, having a small bifid membrane on the nose, no tail, and the interfemoral membrane little developed. Bats of this genus have two great, projecting, approximate upper incisors, and similar lancet-shaped superior canines, all very sharp-pointed, and arranged to make a triple puncture like that of a leech. There are four bilobate inferior incisors, the innermost separated by a wide interval; the lower canines are small; there are no true molars, but two false molars in the upper jaw, and three in the lower, of a peculiar form, apparently unfitted for mastication. The intestine is shorter than in any other mammal, and the whole structure indicates that blood is the sole food. In parts of South America vampire-bats are very numerous, and domestic animals suffer greatly from their nocturnal attacks. They seem to take advantage of an existing wound, but they can also make one. In parts of Brazil the rearing of calves is impossible on account of these bats, and there are districts, chiefly those in which limestone rocks prevail, with numerous caves, in which cattle cannot be profitably kept. Vampire-bats sometimes attack men, when sleeping in the open air; but the stories of their fanning their victims with their wings, while they suck their blood, are fabulous.—The name Vampire or Vampire-bat has also been given erroneously to frugivorous bats of s.e. Asia and the Malay Archipelago, as well

as to the Spectre-bats (q.v.) of the genus Phyllostoma. See PHYLLOSTOMIDÆ; BAT.

VAMPLATE, or VAMPLET. See under VAMBRACE.

VAN, n. *văn* [an abbreviation of *vanguard:* F. *avant-garde:* F. *avant,* before—from L. *ab antĕ,* from before]: the first line or foremost division of an army, in opposition to the rear or last line or division; the front line or foremost division, as of a fleet; the front of any advancing body. VAN-COURIERS, avant-couriers; light-armed soldiers sent before armies to obtain information, etc. VAN-FOSS, *-fŏs* [L. *fossa,* a ditch]: the outer ditch of a rampart. VANGUARD, the part of an army which precedes the main body on a march.

VAN, n. *văn* [contr. of CARAVAN]: a large covered carriage or wagon for moving furniture, etc.; a conveyance for a wild beast or other show; a carriage which may serve the purpose of a dwelling, as among gypsies and other wanderers; a covered spring-cart for conveyance of goods; one of the carriages of a railway train used in Great Britain for luggage, etc.; the baggage-car.

VAN, n. *văn* [L. *vannus,* a fan]: in *OE.,* anything spread wide by which a current of air is raised; a fan; a wing with which the air is beaten.

VAN, *vân:* vilayet or province of Turkey in Asia; bounded e. by Persia, n. by the lately acquired Russian possessions in Armenia; 15,000 sq.m. It consists mainly of a lofty basin, surrounded by steep mountains, in the center of which is the Lake of Van. The climate is very hot in the lowlands. The productions are corn, fruit, wine, flax, tobacco, cotton, timber, manna, gall-nuts, and honey. The pasturage being exceedingly good, great numbers of live stock are reared, and, with the other agricultural products, form the chief exports. Pop. variously stated—half a million to a million or more.

VAN: fortified town of Turkey in Asia, capital of the vilayet of Van; in a very fertile plain, near the s.e. shore of Lake Van; 145 m. s.e. of Erzerum; lat. 38° 30′ n., long. 43° 18′ e. It is overlooked by a citadel, now much dilapidated. The streets are narrow, dirty, and ill paved, but most of the houses are well built. The principal public buildings, in addition to the citadel, are the mosques, the Armenian churches, the baths, the caravanseras, and the bazaars. The industries of Van are agriculture and the production of coarse chintzes, a woolen cloth called shayak, goat-hair water-proofs, moire antique, and soap prepared from the saline efflorescence of Lake Van. Among the Armenians Van is always called Schamiramakert—i.e., Town of Semiramis. Ancient ruins, and cuneal inscriptions in which the name Xerxes frequently occurs, are found. Pop. estimated 30,000 to 35,000.

VAN, LAKE OF: inland sea of Turkey in Asia, in the vilayet of Van, encircled by mountains; 80 m. long, and

50 m. wide at the greatest; 1,500 sq.m. It is 5,400 ft. above sea-level, is fed by about eight streams, and has no visible outlet. The narrow part, extending n.e. about 40 m., is very shallow. There is little navigation on the lake. Its waters are somewhat salt, and the only fish caught in it are a kind of bleak, which are salted and exported as sardines throughout Asia Minor. Lake Van was called by the ancients *Arsissa Palus;* also *Thospitis,* from its Armenian name *Tosp.*

VANADIUM, n. *vă-nā'dĭ-ŭm* [after *Vanadis,* a Scandinavian deity]: rare met; a rare element that is closely related to arsenic, phosphorus, and nitrogen in its general chemical behavior. Symbol V; atomic weight, 51.2; specific gravity, 5.5. It was discovered by Seffström in 1830. Vanadium is found widely distributed in nature, but in very small quantities and always in combination. The most important minerals containing it are *vanadinite* $(PbCl)Pb_4(VO_4)_3$ and *decloisite* $(PbTn)_2(OH)VO_4$. Also found in many copper, lead and iron ores. The element is obtained in the free state by heating the dichloride in a stream of hydrogen. It is a silver-colored somewhat crystalline powder that is acted on but slowly by the air at ordinary or slightly elevated temperatures, but when ignited burns brightly to V_2O_5. Not soluble in hydrochloric or dilute sulphuric acids, but easily so in nitric, hydrofluoric, or concentrated sulphuric acids. Vanadium forms three basic oxides, V_2O, V_2O_2, V_2O_3, and two acid oxides, V_2O_4 and V_2O_5, the last being of greatest importance. It is a reddish yellow powder that dissolves readily in alkaline hydroxides or carbonates, forming salts called vandates. These salts, like those of phosphoric acid, exist in three forms, ortho, pyro, and meta. Ammonium metavanadate is used in the manufacture of a dye called analine black and also in the preparation of vanadium ink. VANAD'IC, a. *-năd'ĭk,* pertaining to or obtained from vanadium, as *vanadic acid;* also VANADOUS, a. *văn'ă-dŭs.* VANADATE, n. *văn'ă-dāt,* or VANADIATE, n. *vă-nā'dĭ-āt,* a salt of vanadic acid. VANAD'INITE, n. *-năd'ĭ-nīt,* the vanadate of lead, a rare mineral of a yellowish-brown color and resinous luster.

VANBRUGH, *văn-brô',* SIR JOHN: English architect and dramatist: 1666(?)—1726, Mar. 20; b. in Cheshire; son of a merchant, and grandson of a Protestant refugee of Ghent, who had settled in England in the reign of Elizabeth. Vanbrugh was educated in France, where he entered the French army, but left it after attaining the rank of captain. Returning to England, he soon acquired reputation as an architect. In 1695 he was made secretary to the commission for endowing Greenwich Hospital. His first attempt at play-writing was *The Relapse, or Virtue in Danger,* whose first sketches he had made while in the army. It was brought out at Drury Lane (1697) with such success, and obtained such popularity, that Vanbrugh ranked ever after as one of the leading wits

and dramatists of his day. About the same time he wrote his famous comedy *The Provoked Wife* for Lincoln's Inn Theatre, where it was produced with even greater success than had attended *The Relapse*. He then, in partnership with Congreve, started a theatre in the Haymarket, and there brought out *The Confederacy*. But so ill suited was this building for speaking in that not even the brilliant wit and racy humor of *The Confederacy* could command an audience, and, Congreve abandoning the scheme, the theatre had to be closed. In 1702 he erected, for the Earl of Carlisle, the noble palace of Castle Howard, in Yorkshire; and this led to his being employed as architect of many mansions for the noble and the wealthy in other parts of the country. His reputation was so high that he was commissioned to erect Blenheim House, which the parliament had voted to the Duke of Marlborough; but as no particular fund had been provided for the expenses, and as parliament refused, when applied to, to grant money for that purpose, Vanbrugh's commission was more honorable than lucrative. The queen supplied from her own private purse most of the funds; but after her death this supply was stopped. The Duke of Marlborough, also having died, left a specific fund to meet the architect's claims; but the duchess not only meanly refused to pay Vanbrugh his salary, but dismissed him from his office; and the house was completed under other management, though from the original designs. After much trouble, Vanbrugh got nearly all the money due him; but became a steadfast foe of the Duchess of Marlborough. In 1714 he was made comptroller of royal works. Vanbrugh died at Whitehall, leaving his drama *The Provoked Husband* unfinished. His plays are licentious in tone and loose in morality, but show brilliant wit, keen satire, and genuine humor. They lack the polish of Congreve's dramas, but are not infected with the artificiality, stiffness, and labored brilliancy which disfigures so many of Congreve's best scenes. The interest is sustained throughout; the characters—such as they are—are real, natural, and racy; the situations striking, and the dialogue is brilliant and unflagging. The best edition of his plays is in Leigh Hunt's *Comic Dramatists*, to which is prefixed an excellent Life of Vanbrugh. His architectural works are still among the best of their kind—massive, picturesque, varied in outline, and wonderfully skilled in composition, though a frequent carelessness in the management of details spoils some of his best effects. Some recent critics, while fully crediting Vanbrugh with surprising skill in details in both architecture and comedy, have pointed out his defects in both lines as due to a lack of the 'fusion' and blending necessary to a comprehensive whole.

VAN BRUNT, *văn brŭnt*, HENRY: architect: b. Boston, Mass., 1832, Sept. 5; d. 1903, Mar. Having grad-

uated at Harvard 1854, he studied architecture; served as a staff-officer in the navy two years during the civil war; then practiced as an architect first in Boston, and later in Kansas City, Mo. He designed Memorial Hall, Harvard Library and Medical School, also the Episcopal theological school at Cambridge, Mass., and various buildings in Boston and other cities of Massachusetts. In the West his firm (V. B. & Howe) were architects of many great mercantile buildings and of station buildings on the Union Pacific railroad.

VAN BUREN, *văn bū'rėn*, MARTIN: eighth president of the United States: 1782, Dec. 5—1862, July 24 (president 1837-41); b. Kinderhook, N. Y. At the age of 14 he began to study law; he was an active politician before he attained his majority; and was admitted to the bar 1803. He was a zealous supporter of Thomas Jefferson; was elected surrogate of Columbia co. 1808. In a convention of the republican party at Albany 1811 he was prominent among the opponents of the recharter of the U. S. Bank. He was elected to the state senate 1812, and there upheld Gov. Tompkins in his action against the 'Bank of America.' He was attorney-general of the state 1815-19, and meantime was again elected to the senate 1816. With Benjamin F. Butler (of New York), Edwin Croswell, and William L. Marcy, he formed a combination of democratic leaders later known as the 'Albany Regency,' which for 20 years dominated the politics of New York. As member of the New York constitutional convention 1821, Van Buren favored an extension of the electoral franchise, but opposed universal suffrage. He was chosen United States senator the same year, and re-elected 1827, but resigned 1828 to assume the governorship of the state. He was appointed by President Jackson secretary of state 1829, Mar.; but resigned 1831, Apr., and went to England in Sept. as United States minister plenipotentiary: the senate, however, refused to approve his appointment, and he returned home. He was elected vice-president of the United States 1832, and president 1836. A monetary crisis existed at the beginning of his term of administration; the banks suspended specie payment, and Van Buren urged the establishment of an independent treasury system: after much acrimonious debate the Treasury Bill was passed in the last year of Van Buren's administration. Congress also enacted the 'pre-emption law' of President Van Buren, giving to settlers on public lands the preferential right of purchase. Van Buren was renominated for the presidency 1840; the nominee of the whig party was William Henry Harrison: after the most exciting political canvass till then ever seen in the United States, Van Buren suffered a disastrous defeat, receiving only 60 electoral votes out of 294; yet the popular suffrages for Van Buren were 367,000 in excess of those that he had received 1836. His last message to congress recommended the enactment of more stringent laws to suppress the

African slave-trade. He sought the democratic nomination to the presidency again 1844, but was rejected on account of his opposition to the annexation of the republic of Texas. The democrats having nominated Gen. Lewis Cass 1848, Van Buren was named as an opposition democratic candidate by a convention of the 'free democracy,' on a platform which declared that 'the federal government should relieve itself of all responsibility for the existence or continuance of slavery.' This defection resulted in the defeat of Cass and the election of the whig candidate, Gen. Zachary Taylor. Van Buren now retired from political life. He left in MS. a work which was published 1867—*Inquiry into the Origin and Course of Political Parties in the United States.*

VAN BUREN: Ark.; city, county-seat of Crawford co.; on the Arkansas river, and on the Saint Louis, I. M. & S., and the Saint Louis & S. F. railroads; about 140 m. w. of Little Rock. It is in an agricultural region and has considerable lumber interests. The chief manufactures are lumber products, canned fruits, cotton products, ice, cigars, wagons, and agricultural implements. There are one high school and elementary schools, and one daily and four weekly newspapers. The two banks have a combined capital of $200,000 and deposits of $424,080. Pop. (1890) 2,291; (1900) 2,573; (1910 est.) 2,800.

VAN BUREN: Maine; town in Aroostook co.; on the Saint John river, and on the Canadian Pacific and the Bangor & A. railroads. It is in the n.e. part of the state, on the New Brunswick boundary. Van Buren was incorporated in 1881 and is an important distributing point for many of the lumber camps. It is connected by stage lines with Fort Kent, Fort Fairfield, and other places. The educational institutions are Saint Mary's College, public and parish schools, and Good Shepherd Academy. Pop. (1890) 1,168; (1900) 1,878; (1910) 3,065.

VANCE, *văns,* ZEBULON BAIRD: American politician: b. Buncombe co., N. C., 1830, May 13; d. Washington, D. C., 1894, Apr. 14. After obtaining an education at Washington College, Tenn., and the University of North Carolina, studying law and being admitted to the bar in 1853, he established himself in practice in Asheville, N. C. The next year (1854) he was sent to the state legislature and in 1858 was elected to congress to fill the vacancy caused by the resignation of Representative Clingman. He was opposed to secession, but at the opening of the civil war adopted the confederate cause and became colonel of the 26th North Carolina regiment. He was elected governor in 1862 and re-elected in 1864, and in 1870 was elected to the United States senate, but not being allowed to take his seat there on account of his political disabilities not having been removed, he resigned in 1872. In 1876 he again became governor, and being elected to the United States senate in 1879 retained his seat there until his death.

VANCE'BURG: Ky.; town, county-seat of Lewis co.; on the Ohio river, and on the Chesapeake & Ohio railroad; about 18 m. w. of Portsmouth, Ohio. It is in an agricultural region; nearby are valuable stone quarries. The manufactures are leather, hubs, staves, spokes, flour, feed, and dairy products. The educational institutions are Riverside Seminary, public schools, and a school library. Pop. 1,300.

VAN CORTLANDT, Philip: American soldier and legislator: b. Cortlandt Manor, Westchester co., N. Y., 1749, Sept. 1; d. there, 1831, Nov. 5. Graduated from King's College (now Columbia University) in 1758; he began work as a surveyor, but at the outset of the Revolution received the commission of lieutenant-colonel, commanding the 4th battalion of New York infantry. In 1776 he was made colonel of the 2d New York regiment. He fought 1777, Oct. 7, at the battle of Saratoga (Stillwater, Bemis' Heights), in Sullivan's campaign against the frontier Indians, and in the Virginia campaign of 1781. He retired from the service with the grade of brigadier. A member of the New York assembly in 1788-90, he was also in 1788 a delegate to the state convention which adopted the Federal Constitution, and in 1791-4 a state senator. From 1793 to 1809 he was a representative in congress. He accompanied Lafayette in the latter's tour of the states in 1824.

VANCOUVER: city and seaport of British Columbia; on Burrard Inlet, on the Gulf of Georgia opposite Vancouver Island in the Pacific Ocean, and on the Canadian Pacific railroad, about 12 m. n. of New Westminster and 85 m. n.e. of Victoria. It is the largest city on the mainland of British Columbia and the harbor is one of the largest and finest in the world.

Public Works, Buildings, Etc.—The city acquired the Capilano water-works system in 1892; there are also excellent electric light, telephone and electric railway systems. Stanley park, 940 acres in extent, is the largest of the city parks, which include also East End and False Creek parks. The streets are laid out on the United States block system and are well paved. The public buildings include the custom house, post-office, general hospital, Roman Catholic hospital, St. Luke's home, several orphanages, opera house, Y. M. C. A. building, the Vancouver club, the Hudson's Bay Company block, the Canadian Pacific railway station, numerous banks, hotels, etc.

Churches and Schools.—Vancouver has many handsome church edifices and the largest denominations represented are the Church of England, Presbyterian, Methodist, Baptist, Congregational, and Roman Catholic. The Y. M. C. A. also has a fine building. The public schools have 101 teachers and 5,003 pupils. The annual expenditure for educational purposes is over $100,000. Vancouver College, affiliated with McGill University, Montreal, is located here.

MARTIN VAN BUREN.
Eighth President of the United States.

Industries.—The industrial development of the city was checked by the fire of 1886 and again in 1894 by the Fraser river floods, but not for any length of time. Industries were immediately resumed and expanded till they now include saw-mills, iron works, ship yards, breweries, sugar refinery, railway machine shops and engineering works, pork-packing works, fish canning factories, jute, cooperage and furniture works, candy factories, fruit-preserving factories, etc. The industries of the city were further stimulated by the boom of the Klondike gold fields in 1897-8, enormous quantities of supplies and general outfitting material being required.

Commerce and Finance.—Vancouver is a customs port and the western terminus of the Canadian Pacific railway; has a large trade with Japan, China and Australia by the Canadian Pacific steamship line and the Empress line; and is connected with the Fraser valley district by the New Westminster and Vancouver Electric railway. The city is thus one of the chief commercial and distributing centres of the province, sharing the bulk of the trade with Victoria. The exports of Vancouver port in the year ending 1905, March 31, were $5,009,679; the imports $5,685,924; the total revenue $1,454,034. The inland revenue was $321,615; the post office gross revenue in the year ending 1904, June 30, was $86,592; the money orders issued totalled $433,131 and paid $548,607; the returns of the clearing house for the year ending 1905, March 31, showed a total of $76,489,013, as against $68,783,259 in 1903-4 and $56,013,002 in 1902-3. The assessed valuation of property in 1906 was $37,559,-165.

Government and History.—The municipal affairs of the city are administered by a mayor and council of 12 members elected annually. There are also the usual city departments and subordinate officials. In 1885 the site of the present city was occupied by a standing forest and a few wooden shacks, originally called Gastown and later Granville. Its development was chiefly due to its facilities as a shipping point. The site was chosen for its fine harbor, and it was decided to make it the w. terminal of the Canadian Pacific road. The city was laid out and built; was incorporated in 1886, February, and by the following spring contained about 2,000 inhabitants. On June 13 of that year the town was nearly swept out of existence by fire, but within 6 months 350 new buildings had been erected at a cost of $500,000, a new hotel had been commenced by the Canadian Pacific Railway Company and in 1887, May 23, the railway entered the city. The town experienced a wave of commercial depression during 1892-3 and in 1894 the Fraser river floods caused considerable damage, but the trouble was only temporary and since that time the progress of the city has been phenomenal and substantial. Pop. (1891) 13,709, (1901) 26,133, (1907) estimated, 52,000.

VANCOUVER, Wash.: city, county seat of Clarke co.,

on the Columbia river, and on the Vancouver, K. and Y., and the Northern Pacific railways; about 8 miles n. of Portland, Ore. It has steamer connections with the Columbia river ports, and with a number of the Pacific ports. It was founded in 1828 by the Hudson's Bay Company, and in 1858 was incorporated. It is in a region noted for its extensive lumber interests. There are many good farms nearby and considerable attention is given to raising live-stock. The chief manufacturing establishments are lumber mills, flour mills, breweries, brick works, and machine shops. The U. S. military department of the Columbia has its headquarters here, and the Vancouver barracks, established in 1849, is one of the best army posts in the country. In the centre of the city is a pretty park, and the principal public buildings are the county court-house, the House of Providence, a hospital, and the schools. The educational institutions are a public high school, founded in 1889, a private high school, Providence Academy (R.C.); Saint James College, public and parish elementary schools, a public library, and two school libraries. A United States land office is here. The government is administered under a charter of 1890, which provides for a mayor, who holds office one year, and a city council. Pop. (1900) 4,006; (1905) 5,000.

VANCOUVER, *văn-kō'vėr*, GEORGE: navigator: 1758-1798, May 10: b. England. At the age of 13 years he entered the navy; was with Capt. Cook in his 2d and 3d voyages, 1772-75 and 1776-80. On his return to England, Vancouver was commissioned lieut. and appointed to command a war-vessel: as lieut. he served under Admiral Rodney in the W. Indies; then on the Jamaica station. In 1791 he commanded a squadron dispatched to n.w. America, Hawaii, and Nootka, to find whether there were any passage from the North Pacific to the Atlantic Ocean. He first made for Australia, where a survey of the s.w. coast was made. After reaching Tahiti and spending several weeks at the Sandwich Islands, he (1792) sighted the western coast of N. America (now California), and navigated the passage through Juan de Fuca which separates the island of Vancouver from the mainland. He spent the autumn in visiting the Spanish settlements in New California, and surveying the coast and coast-region as far south as 35° n. lat. In 1794 he explored Cook's Inlet, and established the fact that it was not a river. Afterward he visited Nootka. Returning by way of Cape Horn, he reached home 1795. The surveying service was extremely arduous, being performed mostly in open boats, and Vancouver's health was broken. The remainder of his life he spent in writing his narrative, *Voyage of Discovery to the N. Pacific Ocean and Round the World* (3 vols., with atlas.)

VANCOU'VER ISLAND: island in the Pacific, forming part of British Columbia and of the Dominion of Canada; bounded w. by the Pacific, e. by Queen Charlotte

VANCOUVER, B. C.

1. Vancouver from the C. P. R. Hotel.
2. City of Vancouver.

Sound, Johnston Strait, Discovery Strait, and Strait of Georgia, which, taken together, form an open sea way, varying in width from 5 to 80 m., separating the island from the mainland; lat. 48° 20′—51° n., long. 123°—128° w.; 250 m. in length, 10 to 70 m. in breadth; estimated about 16,000 sq.m. The main mass of the island is a mountain ridge, with peaks 6,000 to 9,000 ft. high. The coast is generally precipitous. There are, however, in many coast-districts, especially on the s.e. and eastern sides, undulating tracts, thickly wooded, but with patches of open grass-land. The outline of the island is boldly picturesque. The shores are marked by abrupt rocky cliffs and promontories, by pebbly beaches and sheltered coves, with fine harbors. The w. shores are gloomy and frowning in aspect, deeply indented by fiord-like arms of the sea, whose banks are formed by steep rocks, rising like walls. The surface is diversified by mountain, precipice, hill, dale, and lake, and the whole country is more or less densely wooded. There are no navigable rivers, and the streams, which are torrents in winter and are nearly dry in summer, are short, and are valuable only as supplying water-power. Springs are numerous, and the water excellent. The climate closely resembles that of Great Britain, with modifications due to the position of the island. As late as the middle of June, the summer resembles a late English spring—having a clear atmosphere, bright sun, and cool winds. The winter, as a rule, is open and wet; the spring late and cool; the summer, as a whole, drier and warmer than that of Great Britain. The maximum temperature is about 84° F., the minimum about 22° F. The climate of the n. and w. is much more severe. Only a small proportion of the surface is suited for agriculture, four-fifths being little better than barren rock. The usual crops are wheat, barley, oats, and peas: the green crops are turnips, mangel-wurzel, vetches, potatoes —of unsurpassed excellence—and all sorts of vegetables. Of wheat, the average production is 25 to 30 bushels per acre; of oats, 40 bushels; barley, 40 bushels. Fruit-culture is very profitable. Gold has been found; coal is very abundant; copper, silver, lead, and other ores abound. The puma, the bear, and wolf range in the forests; two kinds of deer are found; there are two kinds of grouse, and snipe and wild fowl in great variety. Salmon abound. Extensive banks lie about 32 m. off the s.w. shore—all well stocked with fish, especially the cod, herring, haddock, whiting, halibut, and sturgeon, for which there is a good market all along the coast southward. Among the valuable woods of the island is the white fir or Douglas pine, much used for spars: logs of this tree have been known to 'square' 45 in. for a length of 90 ft. Ship-building is an important industry.—The chief towns are Victoria (q.v.), cap. of the island and of the prov.; Nanaimo, 73 m. by rail n. of Victoria, centre of the coal-mining industry (pop. 4,000): the annual output of coal—both anthracite and bituminous—is about

250,000 tons, giving employment to 1,100 men; Esquimalt, 3½ m. w. of Victoria, an important naval and milit. station, having a government dry-dock 450 ft. long, 26 ft. deep, and 65 ft. wide at the entrance.

The island was discovered 1592 by Juan de Fuca; and its coast was roughly surveyed 1778 by Cook, and later (1792-94) by Capt. Vancouver (q.v.) of the Brit. navy. Its possession was secured by Britain by treaty 1846; previous to 1858 it was held, with Brit. Columbia, by the Hudson's Bay Company under lease from the crown; later it was for two years an independent colony; in 1866 Vancouver Island and British Columbia were united. Vancouver Island is important to the Dominion and to Great Britain on account of its great natural resources, as well as of its geographical position. The Canadian Pacific railway terminates on the coast opposite its southern end.—Pop. (1901) 27,198.

VAN CURLER, *văn kėr'lėr* (or VAN COR'LEAR). ARENDT: pioneer settler of N. Y.: about 1600-67; b. Holland. He came to New Netherlands 1630, and later became supt. of the manor of Rensselaerswyck, the estate of his kinsman Killian van Rensselaer, which comprised about 1,000 sq.m. of country, reaching from Beeren Island in the Hudson to the mouth of the Mohawk. Van Curler learned the speech of the Iroquois nations, and established friendly relations between the aboriginals and the Dutch, thus erecting a defense of the Dutch colonies against the encroachments of the French from Canada, and establishing a profitable trade in furs with the natives. About 1630 he settled on his own farm at West Troy, still retaining his active interest in the welfare of the colonists and the aboriginals, maintaining peace between them, and checking the trade in alcoholic drink. He brought out from Holland, 1661, a colony whom he settled at Schenectady on lands of their own (not on the Patroon's land), bought from the Mohawks. Van Curler was often instrumental in relieving and liberating French missionaries and adventurers held in captivity by the Iroquois. After the English conquest of New Netherlands he was a valued counselor of the new *régime*. The Mohawks, in addressing the governors of the colony of New York, always saluted them as 'Corlear.' He left at his death 2,000 letters and other papers.

VANDA, *văn'da:* genus of plant of nat. order *Orchideæ*. *Vanda cærulea*, one of the most beautiful of Indian orchids, is highly prized by cultivators, and plants sell at high prices. It has panicles of azure flowers. Hooker found it on the Khasia Mountains, growing in great profusion, epiphytical upon the oak, banyan, etc.

VANDAL, n. *văn'dăl* [L. *Vandăli, Vandili, Vanduli*, a people of n. Germany in the time of Tacitus: Ger. *wandeln*, to walk, to travel]: one of a barbarous race inhabiting the southern shores of the Baltic, which invaded the Roman empire in the 5th c., noted for their

fierceness and their indiscriminate destruction of the monuments of art and the productions of literature; hence, one who destroys any monument of art or literature; one hostile to the arts or literature; a barbarian. VAN'DAL, a., or VANDALIC, a. *văn-dăl'ĭk*, pertaining to or resembling the Vandals; rude; barbarous. VANDALISM, n. *văn'dăl-ĭzm*, the spirit or conduct of the Vandals; any outrage against civilized usages.—The *Vandals* were probably of Germanic origin, though some consider them Slavic. Procopius, who agrees with Pliny in considering them one with the Goths, states that they originally occupied the country about the *Palus Mæotis* (Sea of Azov): but it appears that they afterward migrated n.w., and settled s. of the Baltic, between the rivers Vistula and Viadus (Oder). They make their first appearance in history in the 2d c., when they inhabited the n.e. slopes of the Riesengebirge (called, after them, *Vandalici Montes*), figuring as associates of the Marcomanni and Quadi in plundering expeditions into Pannonia; and in the wars with Marcus Aurelius. In the latter half of the 3d c. they are found, with the Goths and Gepidæ, in the Roman province of Dacia. According to Jornandes, the Gothic king Geberic annihilated a large part of the nation on the banks of the Maros: the remainder were transplanted by Constantine to Pannonia, where for 60 years they lived in peace. At the beginning of the 5th c. they abandoned their new homes, and in company with the Suevi, Alani, and other German tribes, led by King Godegisil, burst into Gaul, which they ravaged for three years. Thence they swept through the passes of the Pyrenees into Spain, which suffered similar ravage; and finally, after much quarrelling and fighting with their German associates, they settled in a part of Bætica, which received from them the name *Vandalitia* (mod. *Andalusia*). In 429, at the call of Bonifacius, gov. of Africa, who had been driven into rebellion by the false representations of Aëtius (see VALENTINIAN III.), they crossed the Strait of Gibraltar, under Genseric (q.v.), 50,000 to 80,000 strong, carrying devastation and ruin from the Atlantic to the frontiers of Cyrene. They were joined by the Donatists (q.v.), a sect of African heretics, and, being themselves Arians, they inflicted great cruelties on the orthodox Christians. Meanwhile Boniface had discovered the treachery of his rival Aëtius, and, seeking too late to remedy the consequences of his too credulous resentment, he advanced with a small and hastily-levied force; but was defeated with considerable loss, and driven into Hippo (now Bona), which he defended for more than 14 months. Boniface, reinforced by a Byzantine army under Aspar, now sallied out upon the Vandals and met a second defeat, which decided the fate of Africa. In 439 Genseric (correctly Gaiseric) broke the peace which he had concluded with Valentinian III., 435, and conquered Carthage. A new peace was established, which recognized the authority of the Vandals over n.

Africa from the Atlantic to Cyrene, over the Balearic Isles, Sardinia, Corsica, and part of Sicily. In 455 the Vandals invaded Italy, and plundered Rome for 14 days. Their mutilation and destruction of the works of ancient art collected in the city originated the application of the term *Vandalism* to all similar barbarism. After the death of Genseric (477), his son, Hunneric, cruelly persecuted the Catholic Christians, warred against the Moorish races in n. Africa, then trying to recover their independence, and kept the Mediterranean and its coasts in alarm by his piracies. His successors, Guntamund (d. 496) and Thrasamund (d. 523), were comparatively mild and tolerant rulers; the latter was even friendly to literature. The warm climate, with its luxury and pleasures, now began to enervate the Vandals, and the natives in various parts of Africa showed that they had ceased to fear them. Thrasamund was compelled to solicit aid from his brother-in-law, Theodoric (q.v.), who sent him a Gothic contingent to help him against the Moors of Tripoli. After his death, Hilderic, son of Hunneric, became ruler; but he showed such strong leanings toward Catholicism (owing to his long residence in Constantinople) that his subjects grew discontented, and he was overthrown by his uncle, Gelimer, 530. This led Emperor Justinian to send an expedition under Belisarius against Gelimer, 533. When Gelimer heard of the arrival of the great Byzantine general, he caused Hilderic and his sons to be put to death, but was himself soon forced to seek refuge in the wilds of Numidia. In 534 he surrendered, was carried to Constantinople in triumph, and died in Asia Minor. Most of the Vandals were drafted into the imperial army, and perished in the wars with Persia. The few who remained in Africa rapidly disappeared among the natives.—See the histories of the Roman empire; also Papencordt (1837), and works of Felix Dahn on the ancient Germanic peoples (1861-71).

VANDAL, *vân-dâl*, Louis Jules Albert: French historian: b. Paris 1853, July 7. He was educated at Paris, and appointed to a professorship in the Ecole des Sciences Politiques. His first literary work was a book of travel, *En Karriole à travers la Suède et la Norvège.* He has devoted himself mainly to writing diplomatic history, making an exhaustive study of state documents. His works in this field are distinguished for elegance of literary form as well as for accuracy in detail, and a scholarly grasp of his subject. They include *Louis XV. et Elizabeth de Russie* (1882); *Ambassade Française en Orient sous Louis XV.* (1887); *Napoléon et Alexandre I.* (1891-3); *L'Odysée d'un Ambassadeur;* he has also dealt with the internal history of France in his *Le 18. Brumaire* and *La conquête de Paris par Bonaparte.* In 1897 he was elected a member of the French Academy to succeed Leon Say.

VANDALIA, *văn-dā'lĭ-a.* Ill.: city, county-seat of

Fayette co.; on the Kaskaskia river, and on the Illinois Central and the Terre Haute & I. railways; about 65 m. n.e. of Saint Louis, Mo. It was settled in 1816, and was the capital of the state from 1818 to 1836. The city is in a fertile agricultural region in which considerable attention is given to stock-raising. The chief industrial establishments are a paper mill, foundry, tarring plant, wagon factory, manufactory of butchers' blocks, brick works, stave factory, and machine shops. The principal buildings are the old capitol, the county court-house, and several business blocks. The educational institutions are a high school, public graded schools, and a public library. The government is vested in a mayor and common council. The city owns and operates the water-works.—Pop. 3,100.

VANDENHOFF, *văn'dĕn-hof*, GEORGE: actor and elocutionist: b. England, 1820, Feb. 18. Having appeared on the Covent Garden stage in London, he settled in the United States 1842, and for 16 years had a successful career as actor in this country. Retiring from the stage 1856, he studied law, and was admitted to the bar 1858, but scarcely entered practice. He travelled through the United States and England, giving public readings and conducting classes in elocution. He wrote: *The Art of Elocution; Clerical Assistant; A Lady's Reader*, and two vols. of *Reminiscences* and *Notes*.—Vandenhoff's wife (d. 1854), a successful actress, retired from the stage and gave lessons in dramatic action and elocution.

VANDERBILT, *văn'dĕr-bĭlt*, CORNELIUS: financier; 1794, May 27—1877, Jan. 4; b. near Stapleton, Staten Island, N. Y. At the age of 16 years he owned a boat in which he transported passengers between Staten Island and New York, and in a few years was owner of or had an interest in several sloops, schooners, etc., plying in New York harbor and the Hudson river. He was employed as steamboat capt. 1817-27, but then became owner of a ferry service between New York and Elizabeth, N. J. He began to build steamboats 1829, and established lines of transportation in many directions; and before he was 40 years old he had accumulated a fortune of $500,000. His popular title 'Commodore' was bestowed in consideration of his activity as a builder of steamboats and manager of steamboat lines. In the days of the California gold fever, Vanderbilt made large profits by establishing a line to the Pacific *viâ* Nicaragua Lake. He sold his interest in the Nicaragua line to a company 1853; and when the purchasers failed to make payment, Vanderbilt became their competitor, ruined their trade, and added enormously to his own wealth. While England was engaged in the Crimean war, Vanderbilt established a steamship line of three fast vessels between New York and Havre. Though he was a large holder of railroad securities as early as 1844, not till 1863 did he rise to prominence as an exploiter of that kind of property. He

then bought a large proportion of the stock of the New York and Harlem railroad, obtained a valuable franchise from the legislature, and thus quickly caused the stock to rise in value from 10 per cent to par. Through a miscalculation of his rivals in the stock exchange, Vanderbilt was enabled to buy nearly all the stock of the Harlem at artificially low prices; then he sold again at an enormous advance. He now began to buy shares in the Hudson River railroad, got control of it, and had the two previously competing roads consolidated by act of the legislature: again the devices of his rivals inured only to Vanderbilt's advantage: buying the stock at less than $75, he sold what he was willing to part with at $285. Then came the acquisition of the lines from Albany to Buffalo, and the formation of the N. Y. Central Railroad Co. Of other lines he successively obtained control, till he was master of a continuous line from New York to Chicago: of the capital stock of this great line ($150,000,000) one-half was owned by Vanderbilt. While living, he gave $50,000 to establish in New York the 'Chh. of the Strangers,' and $1,000,000 to found the Vanderbilt Univ. (q.v.). He left his whole estate (estimated at $100,000,000) to his son William Henry Vanderbilt (q.v.), except $11,000,000 bequeathed to William Henry's sons, and $4,000,000 to his own two daughters.

VAN'DERBILT, William Henry: capitalist: 1821, May 8—1885, Dec. 8, b. New Brunswick, N. J.; son of Cornelius Vanderbilt (q.v.). He became clerk to his father at the age of 17 years, but after a year entered a bank as clerk; he retired to a farm 1842. His able management as receiver of the Staten Island railroad caused his father to recognize him as his destined successor, rather than Cornelius Jeremiah Vanderbilt, elder bro. of William. To William was intrusted the responsible management of Cornelius Vanderbilt's great railroads, and in this post the son further justified the father's confidence in him. On the father's death, William succeeded to the bulk of the paternal estate. He compromised with his bro. Cornelius Jeremiah for $1,000,000, and with his two sisters for $200,000 each a suit brought by them for a larger share in the estate left by Cornelius Vanderbilt. He gained control of many additional railroad lines, built a magnificent residence in New York; was an ardent lover of fast horses; gave $200,000 to the Vanderbilt Univ., $100,000 to found a theological school in the same institution, and $10,000 for a library there; $500,000 to the New York College of Physicians and Surgeons to erect new buildings; $50,000 to the Chh. of St. Bartholomew, New York; $100,000 to the men employed on the N. Y. Central railroad; $103,000 to bring from Egypt to New York and there erect the obelisk now in the Central Park; and $150,000 to Gen. Ulysses S. Grant (a loan which Vanderbilt strove to have Gen. Grant accept as a gift). By his will he left to each of his 8 children $10,000,000, to Cornelius, his eldest son, $2,000,000 ad-

ditional, and to Cornelius's eldest son $1,000,000; the residue went in equal shares to his two eldest sons, but charged with an annuity of $200,000 to his widow. His testamentary bequests to public and charitable institutions amounted to $1,000,000.—His eldest son, CORNELIUS (b. Staten Island, N. Y., 1843, Nov. 27), was a treasurer (1867-77) and vice-pres. (1877) of the N. Y. and Harlem railroad. He erected in New York a magnificent structure in a prominent situation as a club-house and rendezvous for the employés of his railroads; contributed $100,000 to the Prot. Episc. cathedral fund; presented to the Metropolitan Museum of Art a valuable collection of drawings by old masters, and Rosa Bonheur's *Horse Fair*.—The second son, WILLIAM KISSAM VANDERBILT (b. Staten Island, N. Y., 1849, Dec. 12), became a clerk in the offices of the Vanderbilt railroads at an early age; was made 2d vice-pres. of the N. Y. Central Railroad Co. 1877; and became pres. of the New York, Chicago and St. Louis Railroad Co. 1882.

VAN'DERBILT UNIVERSITY: institution of learning in Nashville, Tenn.; chartered by the Tenn. legislature as 'Central University of the Meth. Episc. Chh., South,' 1872; but took its present name 1873 in honor of its principal benefactor: see VANDERBILT, CORNELIUS. One condition of Vanderbilt's gift was that Bp. McTyeire, of the Meth. Episc. Chh., S., should be pres. of the board of trustees. A plot of ground comprising 75 acres was purchased as a site, and the corner-stone of the main univ. building was laid 1874, Apr. 28: the univ. was opened for students 1875, Oct. 4, with L. C. Garland, LL.D. as chancellor, and T. O. Summers, D.D. as dean of the theological faculty and *ex officio* vice-chancellor. The number of students in the first year was 300. Students in the theological department, and students in the literary and scientific departments, who are preparing for the Christian ministry, have tuition gratis. In the year 1908 there were in the university 114 professors and instructors; and 902 students subdivided as follows: academical dept., 209 students; biblical dept., 106 students; dept. of law, 77 students; dept. of medicine, 205 students; dept. of pharmacy, 54 students; dept. of dentistry, 143 students; dept. of engineering, 83 students. There were 36,000 vols. in library; value grounds and buildings, $1,525,000; productive funds $1,400,000; income $50,000.

VAN DER GOES, HUGO. See GOES.

VAN DER HELST, BARTHOLOMEW. See HELST. —

VANDERHEYDEN, *vân-dėr-hī'dėn*, DIRK: first settler on the site of Troy, N. Y.: about 1680-1738, Oct.; b. Albany. He obtained a grant of 490 acres of land 1720, on condition of annually paying '5 schepels of wheat and 4 fat fowls.' Vanderheyden conducted a ferry at the *Pocsten Bouwery* (as his farm was called), and 1789 the place took the name of Troy. The Vanderheyden

mansion, built of bricks brought from Holland, is described in Washington Irving's story of Dolph Heyliger in *Bracebridge Hall.*

VAN DER HEYDEN, JAN. See HEYDEN.

VANDERLYN, *văn'dĕr-lĭn,* JOHN: painter: 1775, Oct. 15—1852, Sept. 24; b. Kingston, N. Y. In New York he attended a school of drawing; then in Philadelphia spent some time in the studio of Gilbert Stuart (q. v.), copying some of Stuart's portraits. Aaron Burr aided Vanderlyn financially; he visited France 1796, and there spent 5 years. He painted two views of *Niagara Falls,* which were engraved in London 1804; also portraits of Aaron Burr and his daughter Theodosia. Later he spent several years in England, France, and Italy. His works are very numerous, and many of them are highly esteemed by competent critics. His greatest works are *Marius amid the Ruins of Carthage* and *Ariadne.*

VAN DER MEER, JAN: painter (1632-75). See MEER.

VAN DER MEULEN, ADAM FRANÇOIS: Dutch painter: b. Brussels 1632; d. Paris 1690, Oct. 15. After learning the principles of his art in the studio of P. Snayers he was introduced by Lebrun to Minister Colbert, who commissioned him to paint several pictures for his private gallery and made him superintendent of the Gobelin tapestry manufactory. He subsequently as court painter accompanied Louis XIV. on his campaigns in Flanders for the purpose of painting the most important scenes of the war. A great number of battle pieces, which are crowded with figures, are now in the Louvre, and in the gallery at Versailles, others are at Munich, Dresden, and Saint Petersburg. A good example of his skill as a battle painter is his *Rencounter of Cavalry,* a small but exquisite canvas in the New York Metropolitan Museum.

VAN DER POORTEN-SCHWARZ, J. M. H.: Dutch novelist. See MAARTEN MAARTENS.

VAN DER STUCKEN, FRANK: American musical director: b. Fredericksburg, Texas, 1858, Oct. 15. He studied at the Conservatory of Music, Antwerp, 1881-2, and became Kapellmeister at the Stadt Theater, Breslau, Germany. In 1884 he became leader of the Arion Singing Society of New York and in 1892 accompanied it on a concert tour through Europe. He has been dean of the College of Music of Cincinnati since 1897.

VAN DER WEYDEN, ROGIER (also known as ROGER DE BRUGES, ROGER DE BRUXELLES, RUGGIERO DA BRUGIA, MAESTRO ROGEL, and ROGER DE LA PASTURE): Flemish painter: b. Tournay, Belgium, about 1400; d. Brussels 1464, June 16. He was the pupil of the painter Robert Campin in Tournay (1427), and five years later was made master of the Guild of Saint Luke in his native city. In 1436 he went to Brussels and was appointed municipal painter. He attended the Jubilee at Rome in

1450, and after studying the Italian masters and antiques of Italy and painting several pictures for Italian patrons, one of whom was Cosmo de Medici, returned to Belgium and settled at Brussels. All of his pictures are distinguished by a profoundly religious spirit. They are designed and drawn with great care and power; the modeling is firm and smooth, the technique brilliant, but there is a certain dryness and leanness in the limbs, hands, and feet of his figures, which sometimes almost amounts to distortion and deformity, and is only half redeemed by the beauty of his faces, whose expression is radiant with faith and celestial inspiration. He was the founder of the Brabant school of painting and had numerous pupils and followers, among them Memling, as well as foreigners who learned from him the use of oils in painting and helped to spread the new method, and other characteristics of the Flemish studios. His chief paintings are *The Descent from the Cross,* originally painted for the Church of Our Lady of Victories, at Louvain, now in the Escurial, a copy being also in the Prado gallery; a triptych with the figure of the *Dead Christ* in the central panel; and altar-piece for Saint John's chapel in the church at Middleburgh; *The Adoration of the Shepherds* (all three in the Museum at Berlin); and the triptych with a *Crucifixion* in the centre in Imperial Gallery at Vienna; the *Last Judgment* in the hospital at Beaune; and the *Seven Sacraments* at Madrid. In the Pinakothek at Munich are to be seen his *Adoration of the Three Magi;* and *Saint Luke Painting the Portrait of the Madonna.*

VAN DE VELDE, Adriaan: Dutch painter: b. Amsterdam 1635 or 1636; d. there 1672, Jan. 21. He was the son of Willem Van de Velde the Elder, under whom he studied, and consequently brother of Willem Van de Velde the Younger, the famous marine painter. While he continued his training as a landscape painter under Wynants at Haarlem, P. Wouverman taught him to draw and paint figures, and he eventually rose to be one of the most eminent of the Dutch masters. He was equally successful in history, animals, battle-pieces, genre, and portraits, but his masterpiece, now in the Museum of The Hague, is a landscape in which the figures in the foreground are portraits of himself, his wife, and children. His pictures are highly valued by connoisseurs, and *A Pastoral Scene* (containing cows, a horse, sheep, and figures, $13\frac{1}{4}$x$12\frac{1}{2}$ inches) was sold in 1842 for $22,575. Other important pictures of his are *Starting for the Hunt; Winter Landscape; The Siesta;* etc.

VAN DE VELDE, Willem (The Elder): Dutch painter: b. Leyden 1611 or 1612; d. London 1693. He was in early life a seafaring man, and settling at Amsterdam became famous for his marines in black and white, and in order that he might witness any sea-fight that should take place at a time when the Dutch navy

swept the seas, the states of Holland placed at his disposal a small vessel from which he sketched and painted a great many pictures. He was appointed court painter by Charles II. of England and his successor, James II., and enjoyed a royal pension until his death. His pictures are almost all in black and white and were excelled by those of his son Willem Van de Velde the Younger, who, however, doubtless used the sketches, studies, and drawings left by his father.

VAN DE VELDE, Willém (the Younger): Dutch marine painter: 1633-1707, Apr. 6; b. Amsterdam. He received his education in art from his father (William Van de Velde, the Elder), whom he followed to England. He was employed to color the designs produced by his father, and for this service a pension of £100 a year was assigned. This official employment was merely subsidiary, his time being mainly given to the series of original works which have assured him his rank as one of the greatest of marine painters. In his rendering of the ocean, in its various moods. Van de Velde has had few equals; and his works are now highly valued by the connoisseur. The best are in England, the gallery at Bridgewater House particularly being rich in fine specimens. Van de Velde lived mostly with his father at Greenwich, and afterward in London, where he died.

VAN DIE'MEN'S LAND. See Tasmania.

VAN DYCK, *vân dīk*, Sir Anthony: eminent painter: 1599, Mar. 22—1641; b. Antwerp. His father, according to Houbraken, was a glass-painter. After making considerable progress in the study of art under Van Balen, he was, 1615, admitted as a pupil of Rubens, who was not slow to appreciate his talents. In 1621, by advice of Rubens, he visited Italy. The works of the great Venetians were the first to attract his attention. After leaving Venice he resided in Genoa, then in Rome; and he went a second time to Genoa, whence he made a short visit to Palermo. Van Dyck was five years in Italy, and from the number of portraits painted by him in Genoa—many of the best of his works in his Italian manner are still there—he must have lived a considerable portion of the time in that city. On his return to Antwerp 1626, he executed various pictures for churches, and the portraits classed among those painted in his Flemish style; the series of cabinet portraits of the painters of his day, engraved by Vostermans, etc., and most of which are now in the possession of the Duke of Buccleuch, also were painted at this time. About 1630-1 Van Dyck visited England; but, meeting with no encouragement, remained only a short time. In 1632 he came to England, by invitation of the Earl of Arundel, at the command of Charles I. He was lodged at Blackfriars, was soon afterward knighted, and had a pension of £200 a year settled on him. His commissions were now numerous; he was enabled to live in great style, entertain people of high rank,

and had a country-house at Eltham, in Kent. His wife, Marie Ruthven, by whom he had one daughter, was the daughter of Patrick Ruthven, physician, fifth son of Lord Gowrie. Van Dyck died in London, leaving property to the amount, it is said, of about £20,000. Only 20 years passed from the time when Van Dyck left the studio of Rubens till his death; and during that short career, the number of pictures executed by him, according to what is considered a truthful statement, seems almost incredible, for in Smith's *Catalogue Raisonné of the Works of the Dutch and Flemish Painters* there are descriptions and interesting particulars of more than 950.

This artist's works may be classed as executed in three distinctly marked styles: 1. Those painted in Italy 1621-26: these are distinguished by deep tone and color, and dignity of character and expression: the portraits of the Lomellini Family and an Italian Nobleman, in the Scottish National Gallery, are good specimens of this period. 2. His productions at Flanders 1626-31 are known as done in his Flemish style: these works are executed with much *impasto* or body of color in the lights, and transparency in the shadows. This was perhaps the period of his finest works, among which the best are the portrait of Snyders the painter, now the property of the Earl of Carlisle; the companion-picture of Snyder's wife, now belonging to the Earl of Warwick; and the portrait of Philip le Roy and of his wife, Madame le Roy, purchased by the Marquis of Hertford at the sale of the king of Holland's pictures. 3. The portraits painted in England 1631-41: these are noted for grace and elegance, but many of them were slight in execution, or done partly by assistants. Van Dyck's biographers and critics generally dwell at great length on his Scripture subjects, and express regret that he gave so much of his time to portrait-painting: thus, Sir Joshua Reynolds ranks his painting of the Crucifixion in the Mechlin cathedral one of the finest pictures in the world; but many recent critics express a different view of his Scripture paintings in general. No Scripture subjects by Rubens or Van Dyck, or produced in any of the later schools, will stand comparison, for purity of feeling and appropriate technical execution, with the works of the earlier masters; and the allegorical pieces so much in vogue in the 17th c. are little in accordance with the ideas of the present time. But all the portraits by Van Dyck are interesting and valuable historical presentations, marvellous in their truth and vividness, of characters who acted important parts in an era noted for great events. Van Dyck's etchings are admirable. Several of the portraits in the collection of portraits of artists are etched by him. The impressions of those that were thrown off, when the heads merely were etched, are of great value.—See Carpenter's *Memoir* (1844); the short monograph by Head; but especially the great work of Guiffrey, *Antoine Van Dyck, sa Vie et son Œuvre* (Paris 1882).

VANDYKE, n. *văn-dīk′:* a neck-collar scalloped or pointed as in the portraits by *Van Dyck* (q.v.), in the reign of Charles I., or one of the scallops or points which form the edge or border: V. to slash or cut out, after the manner of certain dresses in the portraits of Van Dyck. VANDYKED′, a. *-dīkt′*, slashed or notched with indentations and points.

VAN DYKE, *văn dīk*, HENRY, D.D., LL.D. (written HENRY VAN DYKE): Presb. minister: b. Germantown, Penn., 1852, Nov. 10; son of Henry Jackson Van Dyke. He graduated at Princeton 1873; then studied in the Princeton Theol. Sem. till 1877, meanwhile receiving license to preach 1876. While in the seminary, he was corresponding editor of the *Presbyterian* and editor of the *Princeton Book*. After a year of study in Berlin, he was pastor of a Congregational church in Newport, R. I., 1878-82; and of the Brick Presbyterian church, New York, from 1883 until his resignation in 1900 to become professor of English literature in Princeton University. He was moderator of the general assembly of the Presbyterian church in the United States in 1902-3. He became favorably known as both preacher and popular lecturer, and in addition to publishing several works of religious character, contributed much also to general literature. The titles of his volumes include: *The Reality of Religion* (1883); *The Story of the Psalms* (1887); *The Poetry of Tennyson* (1889; 5th revised ed. 1894); *Little Rivers* (1895); a collection of essays; *The Gospel for an Age of Doubt* (1896); *The Builders and Other Poems* (1897); *Ships and Havens* (1897); *The Lost Word* (1898); *Fisherman's Luck* (1899); *The Toiling of Felix, and Other Poems* (1900); *The Poetry of the Psalms* (1900); *The Blue Flower*, short stories (1902); *The Open Door* (1903); *Music and Other Poems* (1904); *The School of Life* (1905); *The Spirit of Christmas* (1905); etc.

VAN DYKE, HENRY JACKSON, D.D.: Presbyterian clergyman: 1822, Mar. 2—1891, May 26; b. Abingdon, Penn. He graduated at the Univ. of Penn. 1843; studied theol. at Princeton, and was ordained 1845. His first pastorate was at Bridgeton, N. J., 1845-52; then he was settled in Germantown, Penn., one year; 1853-91 he was pastor of the Second Presbyterian church, Brooklyn, N. Y.; 1891 was chosen prof. in Union Theol. Sem., New York. In the discussion of the question of revising the Presby. confession of doctrine, he was a prominent advocate of liberal revision. Dr. Van Dyke was learned in historical theology, independent and comprehensive in thought; and presented a rare combination of keenness and power in controversy with fervent charitableness of spirit. He was moderator of the Presb. gen. assembly 1876.

VAN DYKE, JOHN CHARLES, L.H.D.: American art critic and librarian: b. New Brunswick, N. J., 1856,

April 21. He was privately educated and in 1877 was admitted to the New York bar, but soon gave his attention to literature, and since 1878 has been librarian of the Sage Library, New Brunswick. For many years he studied art in Europe, has lectured at various universities on art topics, and is professor of art at Rutgers College. He has published: *Books and How to Use Them* (1883); *Principles of Art* (1887); *How to Judge of a Picture* (1888); *Serious Art in America* (1890); *Art for Art's Sake* (1893); *History of Painting* (1894); *Old Dutch and Flemish Masters* (1895); *Modern Flemish Masters* (1896); *Nature for its Own Sake* (1898); *Italian Painting* (1902); *Old English Masters* (1902); *The Meaning of Pictures* (1903); *The Open Sea* (1906); *Studies in Pictures* (1907); etc.

VAN DYKE, Paul, A.M., D.D.: American Presbyterian clergyman and educator; brother of H. Van Dyke (q.v.): b. Brooklyn, N. Y., 1859, Mar. 25. He was graduated from Princeton in 1881, was pastor of the North Presbyterian church, Geneva, N. Y., 1886-9, professor of ecclesiastical history at Princeton Theological Seminary, 1889-92, pastor of the Edwards Congregational church, Northampton, Mass., 1892-8, and since the date last named has been professor of modern European history at Princeton University. He has published *The Age of the Renascence* (1897); *Renascence Portraits* (1905).

VANE, n. *vān* [AS. *fana;* Dan. *fane;* Icel. *fani;* Dut. *vaan;* Ger. *fahne,* a flag or standard: L. *pannus,* a cloth, a rag]: a thin plate of metal, or slip of wood, cut into some figure and made to move on a stem at the top of a spire or any other elevation, in order to show the direction of the wind; a weather-cock; the broad part of a feather on either side of the shaft; the web.

VANE, *vān,* Sir Henry: notable English politician: 1612-62, June 14; b. Hadlow, Kent; son of Sir Henry Vane (the Elder) and Frances Darcy. His father, distinguished statesman in the reigns of Kings James I. and Charles I., and received many proofs of the royal favor; he died 1654.—His son, Sir Henry Vane (the Younger), studied at Westminster and Magdalen Hall, Oxford, where he appears to have adopted those republican principles for which he afterward became famous. His travels in France and Switzerland strongly confirmed him in his aversion to the govt. and discipline of the Church of England, and 1635 he sailed for New England —the refuge of disaffected spirits in those days. He was soon chosen gov. of the Massachusetts colony, and evinced great ability in administration; but his predilections for 'Antinomian' opinions soon caused the loss of his popularity, and about 1636 he returned to England. He now married a daughter of Sir Christopher Wray, of Ashby, in Lincolnshire, and entered on a political career. Through his father's interest he was appointed treasurer of the navy, and entered parliament for Kingston-upon-

Hull 1640; but immediately afterward joined Pym and the anti-court party, of which he became one of the most vehement and resolute leaders. When the civil war broke out, no man was more conspicuous in the military and theological politics of the time than Vane. He carried to the house of peers the articles of impeachment against Abp. Laud; he was a member of the Westminster Assembly, in which he stood with Cromwell in the demand for full religious liberty; he promoted the Solemn League and Covenant, though in his heart he abhored both it and the Presb. form of church govt., and only used them as against the bishops; and he succeeded in inserting the words *according to the Word of God* before the words 'and the example of the best Reformed churches.' He was the chief instrument in carrying the 'self-denying ordinance' (1644), and one of the commissioners at the treaties of Uxbridge (1644-5) and the Isle of Wight (1648). But he did not view with satisfaction the increasing power of Cromwell and the army, and for some time he withdrew from public affairs. In the measures leading to the king's death, he took no part. On the establishment of a commonwealth, however, 1649, Feb., Vane was appointed one of the council of state; yet his antipathy to Cromwell, and his factious activity, so much increased that Cromwell called him a 'juggling fellow;' and was probably in deep earnest when, at the dissolution of the commons, 1653, April, against which Vane protested, he cried out: 'The Lord deliver me from Sir Harry Vane!' In 1656 Vane wrote a book entitled *A Healing Question Propounded and Resolved,* so hostile to Cromwell's protectorate that it was found necessary to imprison the author in Carisbrooke Castle, Isle of Wight. He was released after four months, and Cromwell attempted to win him over, but Vane was inflexible; and during the rule of both Cromwell and Richard, he maintained an attitude of sullen discontent. After meddling a little in the helpless intrigues that followed the abdication of Richard, he was ordered by parliament to withdraw to his house at Raby. When the Restoration took place, Vane was one of the 20 persons excluded from the *Act of General Pardon and Oblivion;* and 1660, July, he was committed to the Tower. He was arraigned, and indicted of high treason before the Middlesex grand jury, 1662, June 2; and having been refused the aid of counsel, and not having been allowed to see the indictment before his trial, presented his own case in a powerful and eloquent plea. But the king was resolved on his death, and Vain was found guilty (on the 6th), and on the 14th was beheaded on Tower Hill. His son was knighted by King Charles, and raised to the peerage by King William, as Lord Barnard of Barnard Castle.

Vane was an intense, restless, unmanageable man—a real thorn in the flesh of the great Cromwell. He had a keen and strong intellect, but used it with that perverse directness that turns honesty itself into a vice. He seems

to have been morally disdainful—perhaps intellectually incapable—of so classifying his theories as to advance the greater ends at some sacrifice of the less. Such a mode tends to fanaticism; accordingly Vane accepted to some extent the tenets of the Fifth Monarchy Men (q.v.), and was given to extravagant religious musings, and to praying (with his friends) in language wholly unintelligible. His integrity and disinterestedness were shown by his resigning his office of treasurer of the navy (about 1641), and, when replaced in it by parliament, insisting on a refusal of its great emoluments (stated at £30,000 annually), stipulating only that a payment of £1,000 should be made to a deputy—See *The Life and Death of Sir Henry Vane, Knight* (London 1662); Birch's *Lives;* and Ludlow's *Memoirs.*

VANG, n. *văng* [Dut. *vangen;* Ger. *fangen,* to seize]: a rope passing from the extremity of a gaff to the rail on each side of a ship, for the purpose of steadying the spar.

VAN GOYEN, Jan Josephszoon: Dutch painter and etcher: b. Leyden, 1596, Jan. 13; d. The Hague, 1656, Apr. His numerous landscapes and marines are to be found in most European galleries and in the Metropolitan Museum of New York, his *Moerdyck* and *Panoramic View of the Environs of Haarlem* are good examples of his style. His pictures are generally painted in a tone which dominates all variegations of color—a rich brown, a tawny gold, or a chilly silver tone, and he has been called the earliest 'tone-painter' of the Dutch school. There is always genuine feeling in his shore landscapes, sand-hills, canals, rivers and village views, while his city scenes are lit up with animated figures. His etched landscapes are rare, and he is only known to have produced five plates. Among his pupils were Jan Steen and S. Ruysdael.

VAN HISE, Charles Richard: American geologist: b. Fulton, Wis., 1857, May 29. He was graduated from the University of Wisconsin in 1879, was instructor in metallurgy there 1879-83, assistant professor 1883-6, and full professor from the last named date, exchanging the chair of metallurgy for that of geology in 1888. He was non-resident professor of structural geology at the University of Chicago 1892-1903, has been connected with the United States Geological Survey from 1883, and was consulting geologist of the Wisconsin Geological Survey from 1897. Among his professional publications are: *Correlation Papers: Archean and Algonquin* (1892); *Principles of North American Pre-Cambrian Geology* (1896); *The Marquette Iron-Bearing District of Michigan,* with Bayly and Smith (1897).

VAN HORNE, Sir William Cornelius: Canadian railway official: b. near Joliet, Ill., 1843, Feb. 3. He was employed in various capacities on several lines until 1880, when he became general superintendent of the

Chicago, Milwaukee & Saint Paul system. In 1882 he accepted the position of general manager of the Canadian Pacific railway, and from 1888 to 1899 served as its president. Since 1899 he has been chairman of the board of the company. The Canadian Pacific Steamship Company was largely developed by him, and in the promotion of steamship traffic with Australia, as well as in other enterprises, he has rendered efficient services.

VANIL'LA: a genus of orchids, of great economic value, on account of its fruits, which furnish the commercial flavoring-extract known by the same name. Several species furnish vanilla, the most important being *V. planifolia,* indigenous to Mexico, and adjacent territories. It is a robust high-climbing plant, living for half a century; and while not in the least epiphytic, it attaches itself to trees by adventitious roots. It bears bright-green, oval, flat leaves, which are fleshy or coriaceous. The flowers are fragrant, and greenish-white, with a trumpet-shaped lip, crinkled about the edges. When cultivated, as it is very largely, in tropical countries, especially in Mexico and Java, the flowers must be fertilized artificially, the finest being chosen, a process carried out by insects in its wild habitat. They then set fleshy fruit, which is carefully picked just before each is ripe. These pods are from six to nine inches long, and are filled with an oily pulp containing the minute seeds. They are called vanilla beans from their long, slender legume-like appearance, but are not fragrant. The characteristic aroma is due to the presence of a volatile oil (vanillin) which is developed by slow curing and fermentation. The pod, as it appears in the markets, is chocolate-colored, wrinkled, slender, and pliable. In the best qualities, or 'frosted vanilla,' the vanillin extrudes its needle-like crystals, forming a delicate efflorescence on the outside of the beans. Although vanilla is a carminative and stimulative drug, it is chiefly used as a flavoring substance, particularly for chocolate and confectionery. The Spaniards found vanilla in use among the Mexican Indians, in conjunction with cocoa, and it is said that it was first imported into England about 1510, when other Mexican products found their way over seas.

There are several inferior qualities of vanilla, such as the Venezuelan and Brazilian varieties, brought from those countries, the latter being distinguished as vanillon, and supposed to be the product of *Vanilla Pompona.* The pods are longer and thicker than those of *V. planifolia.* Guiana vanilla pods (*V. guianensis*) are coarse and frequently split open.

VANILLA PLANT: a tall herb (*Trilisa odoratissima*), with tubular magenta-hued flowers in spreading corymbose panicles, growing in the southern United States. The foliage when dried has the odor of vanilla, and the leaves are used by the Negroes of the South to scent their cabins. It is also put in smoking tobacco.

VANINI, Lucilio: Italian free-thinker: b. Taurisano, about 1585; d. 1619. At Naples and Padua he studied the new learning of the Renaissance and the newer learning of physical science, qualified as doctor *utriusque juris*, and took orders as priest. But his 'naturalist' views, which were regarded as atheistic, soon brought him into collision with the church. He taught in France, Switzerland, and the Low Countries, and fled from Lyons to England, where he was imprisoned. Later he went to Toulouse, where he was arrested and condemned to have his tongue cut out, to be strangled, and to be burned to ashes. He was burned on the day of his condemnation. His *Amphitheatrum Æternæ Providentiæ* (1615) and his *De Admirandis Naturæ Arcanis* (1616) set forth his pantheistic opinions. As an independent thinker and in the doom which he suffered he has many points in common with Giordano Bruno, although as a philosopher he has no claim to be ranked with him.

VANISH, v. *văn'ĭsh* [L. *vanesco*, I pass away—from *vānus*, empty (see Vain)]: to pass from a visible state; to disappear. Van'ishing, imp. Van'ished, pp. *-ĭsht*. Vanishing point, that part of a picture to which all the imaginary lines of the perspective converge.

VANITY. See under Vain.

VANITY FAIR, n. *văn'ĭ-tĭ fär:* a fair described by Bunyan in his *Pilgrim's Progress*, established by Beelzebub, Apollyon, and Legion, for the sale of all sorts of vanities: *figuratively*, the most alluring temptations of the world.

VAN LENNEP, *văn lĕn'nėp*, Henry John, D.D.: missionary: 1815, Mar. 8—1889, Jan. 12; b. Smyrna, Asia Minor, where his father was Swedish consul. Coming to America 1830, he graduated at Amherst College 1837, then studied a year at Andover Theological Seminary, and returned to Asia as an ordained missionary of the American Board. He established several missionary stations in European and Asiatic Turkey; later was connected with several important educational institutions in the Turkish empire, and traveled much in the East. He was notable for fervor, devotedness, and efficiency in missionary labor. He lost his sight 1869, and returned to the United States. Dr. Van Lennep wrote *Travels in Asia Minor*, and *Bible Lands*.

VANLOO, *vŏng-lō'*, Charles André: French portrait painter: 1705, Feb. 15—1765, July 15; b. Nice; younger brother of Jean Baptiste Vanloo, with whom he studied at Rome, and with whom he went to Paris 1719, where, after brief employment as decorative artist at the opera house, he betook himself to portrait painting. He returned to Rome 1727, and there executed some works which laid the basis of his future reputation, and procured him, through the influence of Cardinal de Polignac, a pension from the king of France, and from the pope, 1729, the title of Cavaliere. In Turin he painted for the

king of Sardinia a series of subjects from the *Jerusalem Delivered* of Tasso; and he returned to Paris 1734. The year following he was made a member of the Academy. His subsequent career was one of full prosperity. Tempting offers were made him by Frederick the Great; but he declined them, preferring to remain in Paris. In 1751 he was made a knight of the order of St. Michael by Louis XV., and became director of the Academy. In 1762 he was made chief painter to the king. He died at Paris.

VANLOO, *vân-lō,* JACOB: Dutch painter: b. Sluis, about 1614; d. Paris, 1670, Nov. 26. He was made a member of the French Academy and was famous in his time as a painter of portraits in the style of Der Helst and Rembrandt; scenes from fashionable life; and mythological pictures such as *Diana and her Nymphs* in the galleries of Berlin and Brunswick, and *Œnone* in that of Dresden.

VANLOO, JEAN BAPTISTE: Dutch painter: b. Aix, 1684, Jan. 11; d. there, 1745, Sept. 19. In 1731 he was elected to the Academy; produced many portraits, including that of Louis XV.; and mythological pictures, such as *Diana and Endymion* (in the Louvre); *The Triumph of Galatea* (in the Hermitage at Saint Petersburg). His son, LOUIS MICHEL VANLOO (b. Toulon, 1707; d. Paris, 1771), studied in Rome and Paris, in which latter city he became member of the Academy. Settling at Madrid he was appointed court painter to Philip V. and there are three portraits of the Spanish royal family by him in the Prado Gallery and an allegorical picture.

VANLOO, LOUIS: Dutch painter, son of Jacob Vanloo; b. Amsterdam, about 1640; d. Aix, 1712. At Paris he carried off the first prize of the Academy. His more illustrious son, CHARLES ANDRÉ, was both painter and sculptor, and studied at Rome under Le Gros. In 1719 he went to Paris and assisted his brother Jean Baptiste Vanloo in restoring the frescoes at Fontainebleau. He was received into the French Academy in 1735, made professor there two years later, in 1763 director of the Academy and first painter to the king. In the Louvre are his *Æneas Carrying Anchises from Troy* (1729); *Marriage of the Virgin* (1730); *Apollo and Marsyas,* and a portrait of *Queen Maria Leczinska* (1747).

VANNES, *vân:* seaport-town of France, capital of the department of Morbihan; at the mouth of the Vannes, which falls into a narrow inlet of the Gulf of Morbihan; 310 m. w.s.w. of Paris by railway. The town is surrounded by high walls flanked with towers. The cathedral is the most important edifice. Manufactures of linen and woolen cloth and ship-building to some extent are carried on, as well as commerce in honey, wax, wine, and hemp. Pop. (1901) 23,000.

VANNUC'CI, PIETRO. See PERUGINO.

VAN OOSTERZEE, *vân ōs'tėr-zā,* JAN JAKOB, D.D.:

Dutch theologian: 1817, Apr. 17—1882, July 29; b. Rotterdam, Netherlands. He studied theology at Utrecht University 1835-40; then held pastorates, having charge of the principal church in Rotterdam 1844-62. Thereafter till his death he was professor in Utrecht University, lecturing on biblical, systematic, and pastoral theology and homiletics till 1867, thereafter on the New Testament and the philosophy of religion. Dr. Van Oosterzee was a man of deep thought and spiritual fervor, and a leading advocate of the evangelical theology. His works are many; and some have been translated into English—viz., *The Image of Christ; Theology of the N. T.; Year of Salvation; Practical Theology.*

VANQUISH, v. *văng'kwĭsh* [F. *vaincre*, to subdue—from L. *vincĕrĕ*, to conquer, to overcome]: to subdue in a contest; to overcome; to confute; to overpower. VAN'QUISHING, imp. VAN'QUISHED, pp. *-kwĭsht.* VAN'QUISHABLE, a. *-ă-bl*, that can be vanquished. VAN'QUISHER, n. *-ẽr*, a conqueror. VAN'QUISHMENT, n. *-mĕnt*, in *OE.*, defeat. THE VANQUISHED, those defeated in any contest.—SYN. of 'vanquish, v.': to conquer; surmount; subjugate; silence.

VANQUISH, n. *văng'kwĭsh:* a disease in sheep in which they pine away; also spelled VINQUISH.

VAN RENSSELAER, *văn rĕns'sẽh-lẽr*, CORTLANDT, D.D.: Presbyterian clergyman: 1808, May 26—1860, July 25; b. Albany, N. Y.; descendant of Killian Van Rensselaer. He graduated at Yale 1827; studied theology in Union Theological Seminary and elsewhere; was missionary to slaves in Virginia 1833-35; ordained minister 1835; became a Presbyterian pastor in Burlington, N. J., 1837, and in Washington, D. C., 1841. As agent to collect money for Princeton Theological Seminary 1844, he collected $100,000. He held office in various boards of management in the Presbyterian Church; founded the *Presbyterian Magazine;* and spent in promoting benevolent works much of his large patrimony.

VAN RENS'SELAER, HENRY KILLIAN: soldier: 1744-1816, Sept. 9; b. near Albany, N. Y.; great-great-grandson of Killian Van Rensselaer. In the revolutionary war he commanded a New York regiment, and was wounded at the capture of Burgoyne: he carried a musket bullet in his body 35 years. His command was attacked by a strong British force at Ft. Ann 1777, July, and made a gallant defense till the abandonment of Ft. Ticonderoga was announced, when Van Rensselaer withdrew, again severely wounded.

VAN RENS'SELAER, KILLIAN or KILIAEN: great land-owner: 1595-1644; b. Amsterdam, Netherlands. He was a diamond-merchant in Amsterdam and was a member of the Dutch West India Co., whose enterprises he forwarded by loaning his credit and by placing ships at the company's disposal. He 'purchased' from the aborigi-

nals of the colony of New Netherlands a great tract of land extending on the w. bank of the Hudson river 12 m. s. of the present site of Albany, and 'stretching two days into the interior,' and then all the land on the e. side of the Hudson n. and s. of the same site and 'far into the wilderness.' This estate, comprising the modern counties of Albany, Columbia, and Rensselaer, took the name of Rensselaerswyck. Van Rensselaer never visited America: he managed his vast possessions through an agent. His descendants retained ownership of the manor till 1839, when Stephen Van Rensselaer, 9th 'patroon,' sold his townships to his tenants, who had conspired to refuse payment of rents. See PATROON.

VAN RENS'SELAER, STEPHEN: known as 'the Patroon': statesman and patron of learning: 1769, Nov. 1—1839, Jan. 26; b. New York; fifth in descent from Killian Van Rensselaer. Van Rensselaer was educated at Princeton and Harvard colleges, and married a daughter of Gen. Philip Schuyler. Engaging early in politics, which in his time were the pursuit of men of the highest social position, he was elected to the state legislature 1789, and to the state senate 1795; and became lieutenant governor, president of a state convention, and canal commissioner. Turning his attention to military affairs, he was, at the beginning of the war of 1812, in command of the state militia, and led the assault on Queenstown; but the refusal of a portion of his troops, from constitutional scruples, to cross the Niagara river, enabled the British to repulse the attack, and Gen. Van Rensselaer resigned in disgust. As president of the New York board of canal commissioners for 15 years, he promoted the state system of internal improvements; as chancellor of the state university, he presided over educational reforms; and as president of the agricultural board aided to develop the resources of the state. At his own cost he employed Profs. Eaton and Hitchcock to make agricultural surveys, not only of his own vast estates, but of a large part of New York and adjacent tracts in New England —publishing the results 1824; he also paid the expenses of popular lectures on geology through the state. In 1824 he established at Troy an institution for education of teachers, with free pupils from every county—reorganized 1849 as the Rensselaer Polytechnic Institute. Widening the sphere of his political interests, he went to congress 1823, and served several terms, exerting a powerful influence, and furthering the election of John Quincy Adams as president. After an active, useful, and honorable career, he died at Albany.

VAN SCHAICK, *văn skoyk*, GOZEN: soldier: 1737-87, July 4; b. Albany, N. Y. In the old French war, in the skirmish with French and Indians at Crown Point 1756, he was a lieutenant; he was in the expeditions against Ft. Frontenac and Ft. Niagara; became major 1759; was seriously wounded in the battle of Ticonderoga. He was

appointed commander of the 1st N. Y. battalion 1775, Nov., and the same year rendered good service in an expedition to Cherry Valley against the chief Joseph Brandt. He was brigadier-general at the battle of Monmouth; and commanded a detachment 1779, which destroyed the settlements of the Onondagas.

VANTAGE, n. *văn'tāj* [contracted from ADVANTAGE, which see]: superiority; state in which one has better means of action or defense than another: V. in *OE.*, to gain or profit. VANTAGE-GROUND, the place or condition which gives one the superiority over another.

VANTBRACE, n. *văn't'brās* [F. *avant*, before; *bras*, arm]: in *OE.*, armor for the forearm and hand; also VAMBRACE (q.v.).

VAN TWIL'LER, WOUTER or WALTER: Dutch governor of New Netherland: b. Nieukirk, about 1580; d. Amsterdam, after 1646. He was a clerk in the warehouse of the West India Company at Amsterdam when he was chosen to succeed Peter Minuit as director-general of New Netherland. He arrived at the colony in the Soutberg in 1633, Apr., bringing with him the Spanish caravel San Martin, captured on the voyage. In the Soutberg came also Dominie Everardus Bogardus and Adam Roelandsen, the first clergyman and first schoolmaster in the province. Van Twiller was incompetent for his new post, and in his administration there was considerable to warrant the well-known burlesque of Irving in *Knickerbocker*. But he devoted much attention to internal improvements, repaired Fort Amsterdam, built new windmills and other structures, secured large grants from the Indians, extended the trade with the West Indies and New England, and displayed many other excellent activities. He was also alert in defense of the fur trade, by which the colony was realizing large profits. In 1633 Eelkens, who had been commissary at Fort Orange, sailed up the Hudson to within a mile of the Fort in an English vessel, the *William*, bent on a trading enterprise for English capitalists. Van Twiller soon convoyed the *William* out to sea, with the Dutch fleet, and prevented the establishment of English trade upon the river. When Winthrop wrote asserting the superior title of the English to the Connecticut valley, Van Twiller, in a 'very courteous and respectful' letter, suggested that the matter should be adjusted by the English king and the states-general. However, without Winthrop's assent, New Plymouth sent to Connecticut an expedition commanded by Lieutenant William Holmes which passed up the river by the Dutch Fort of Good Hope, and began at Windsor the first English settlement in Connecticut. Lubbertus van Dincklagen, the schout-fiscal, who had been removed and sent to Holland without arrears of pay, preferred charges against his chief; and David Pietersen de Vries, of Hoorn, declared that Van Twiller was 'acting farces' in the province. Van Twiller was

removed in 1637 and succeeded by William Kieft. He held a large estate in the colony, and was an opponent of Stuyvesant in 1650.

VANUX'EM, LARDNER: American geologist and chemist: b. Philadelphia, Pa., 1792, July 23; d. Bristol, Pa., 1848, Jan. 15. He was graduated from the Ecole des Mines at Paris in 1819, and in 1820-6 occupied the chair of chemistry and mineralogy at the South Carolina College. He resigned in the latter year in order to adopt geology as a profession, and in 1827-8 he was engaged under the New York legislature in studying the geological aspects of New York, Ohio, Kentucky, Tennessee, and Virginia. He was state geologist for New York in 1836-42, was a promoter of the Association of American Geologists organized in 1840, and in addition to numerous scientific papers, he published: *An Essay on the Ultimate Principles of Chemistry, Natural Philosophy, and Physiology* (1827); and *Geology of New York, 3d District* (1842).

VAN VEEN, *vân vān*, OTHO (called also OTTOVENIUS): eminent painter: about 1556—about 1634; b. Leyden, of which city his father was a wealthy burgomaster. He received a careful education. When about 15 years old he was sent to Liége, whence, after three years, he proceeded to Rome, and remained in Italy about 8 years. Declining tempting invitations to settle in Vienna, Munich, and Cologne, he went to reside at Brussels, as painter to Alexander Farnese, Duke of Parma and governor of the Spanish Netherlands. Later he opened an academy at Antwerp, at which Rubens was one of his pupils. The new governor, Archduke Albert of Austria, appointed Van Veen master of the mint at Brussels, to which city he returned; and there he died.—His chief works are religious pictures for churches, as seen in the cathedrals of Leyden, Antwerp, and Bruges.

VAN WERT, *văn wėrt:* city, capital of Van Wert co., O.; on the Pittsburg, Fort Wayne & Chicago, and the Cincinnati, Jackson & Mackinaw railroads; 33 m. e.s.e. of Fort Wayne. It is in a lumber region, and has several saw and planing mills, and manufactories of woolen goods, staves, and wagons. There are numerous churches, several union schools, county court-house (cost $120,000), banks, and daily and weekly newspapers. Pop. (1900) 6,422; (1910) 7,157.

VAPEREAU, *vâ-prō'* or *vâ-pėh-rō'*, LOUIS GUSTAVE: author: b. Orleans, France, 1819, Apr. 4. He entered the Ecole Normale to fit himself to teach philosophy, and 1842 became private secretary to Victor Cousin, whom he assisted in editing Pascal's *Pensées.* He was professor of philosophy at Tours 1843-53, and at the same time director of the German classes. He studied law in Paris 1852-54, and began to practice, but became editor of the *Dictionnaire des Contemporains* (1st ed. 1858), and has ever since held that post. He was appointed by the gov-

ernment inspector-general of public instruction 1877; decorated with the cross of the Legion of Honor 1878.

VAPID, a. *văp'ĭd* [L. *vapĭdus*, flat or stale; *vappa*, palled flat wine: allied to *vapor*, steam, exhalation]: that has lost its life and spirit, as by evaporation; spiritless; flat; dull; mawkish; insipid. VAP'IDLY, ad. *-lĭ*. VAP'IDNESS, n. *-nĕs*, or VAPIDITY, n. *vă-pĭd'ĭ-tĭ*, want of life or spirit; deadness; flatness.

VAPOR, n. *vā'pĕr* [F. *vapeur*—from L. *vapor* or *vapōrem*, steam, exhalation]: the elastic aeriform fluid into which most liquids and many solids may be converted by heat, generally invisible; a visible fluid floating in the atmosphere; *figuratively*, something vain or unsubstantial: V. to be exhaled; give out vapor or steam; boast; to brag; to bully. VA'PORS, n. plu. *-pĕrz*, in *OE.*, a name given to a disease characterized by nervous weakness and depression of spirits, in which a variety of strange images float in the brain or appear as real and visible; hysteria; also, a name applied to the empty boasts and talk of a bully. VA'PORED, a. *-pĕrd*, moist; in *OE.*, peevish. VA'PORER, n. *-pĕr-ĕr*, one who makes a vaunting display of his prowess or worth; a braggart. VA'PORING, a. boasting ostentatiously. VA'PORISH, a. *-ĭsh*, affected by hysterics or the disease called vapors. VA'PORISHNESS, n. *-nĕs*, the state or quality of being vaporish. VA'PORY, a. *-ĭ*, full of vapors; in *OE.*, peevish. VA'PORABLE, a. *-ă-bl*, capable of being converted into vapor. VA'PORABIL'ITY, n. *-ă-bĭl'ĭ-tĭ*, quality of being vaporable. VA'PORIZE, v. *-īz*, to convert into vapor. VA'PORIZING, imp. VA'PORIZED, pp. *-īzd*. VA'PORIZA'TION, n. *-ī-zā'shŭn*, the rapid conversion of a fluid into vapor by heat. VA'POROUS, a. *-ŭs*, of or pertaining to vapor; full of vapors or exhalations; proceeding from the disease called vapors. VA'POROUSNESS, n. *-nĕs*, state of being vaporous. VA'PORIF'EROUS, a. *-ĭf'ĕr-ŭs* [L. *fero*, I bear]: bearing or forming vapor. VA'PORIF'IC, a. *-ĭf'ĭk* [L. *facĕrĕ*, to make]: that converts or has the power of converting into vapor or steam. VAPOR-BATH, the application of vapor to the body in a close place; the bath itself.—A *Vapor* is really a gas. As all *solids* except carbon (an exception due probably to our inability to produce a sufficiently high temperature) are melted, or rendered *liquid* by Heat (q.v.), so a further application of heat converts them into *vapor* or gas. That a vapor is a gas is best shown, perhaps, by the beautiful experiments of Faraday (q.v.) and others on the liquefaction of gases. Hydrogen, oxygen, and nitrogen long were exceptions; but now all gases have been liquefied by a proper application of pressure or cold, or of cold and pressure combined. The difference between a vapor and a gas, as these words are used in common speech, is this: a gas is a substance which at ordinary temperatures and pressures exists in a state of vapor, while a vapor is produced by application of heat to a substance found ordinarily in the solid or liquid

form; in other words, gases are the vapors of substances which, in their liquid form, boil at very low temperatures.

The most familiar instance of vapor is aqueous vapor, or Steam (q.v.). At all temperatures, even as low as the freezing-point, ice and water give off vapor, and the quantity produced is determined by the temperature alone—i.e., Evaporation (q.v.) at any temperature continues (more or less slowly, according to the quantity of air or other gas which is present) until the pressure exerted by the vapor on the containing vessel attains a certain definite value, depending on the temperature alone. If the temperature be such that the corresponding vapor-pressure is equal to the pressure of the air, vapor comes off freely, and we have the phenomenon called boiling.

Vapor in a vessel which contains some unevaporated water is thus always *saturated*—i.e., the full amount of vapor capable of existing at the temperature of the vessel is present. If it be compressed, some is liquefied; if allowed to expand, more vapor is formed. If, however, there be no water present in the liquid form, and the temperature be gradually raised the pressure of the vapor will rise, but much more slowly than when water is present, because no more vapor can be formed: in this state, that of *superheated* steam, vapor behaves almost exactly as an ordinary gas.

Chlorine, carbonic acid, sulphurous acid, etc., thus exist at ordinary temperatures as *superheated* vapors; and can therefore be reduced by cold and pressure to the condition of *saturated* vapor, when they are easily liquefied by carrying the process further.

Aqueous vapor may be liquefied by cold alone, or by pressure alone, as we have seen; and at ordinary temperatures it is easy to liquefy sulphurous acid, ammonia, and even carbonic acid and laughing-gas, by mere compression. Gases absorbed by charcoal or by spongy platinum—i.e., condensed by intense molecular forces on the large surface presented by the interstices in these bodies—must in all probability exist in the state of liquids. Carbonic acid is liquefied when exposed to a pressure of 35 atmospheres at ordinary temperatures; and some varieties of charcoal absorb from 80 to 100 times their bulk of this gas. Remembering that, on account of the impenetrability of matter, the gas can be only in the *pores* of the charcoal, and that their whole bulk is but a small fraction of that of the charcoal itself, we see that probably the absorbed gas must be condensed so enormously as to have become liquid. It is probable that, in Graham's process for separating by dialysis (see Osmose) the oxygen and nitrogen of the atmosphere, the film of vulcanized India-rubber employed as septum compels these gases to pass through its pores in a liquid form.

Experiments by Cagniard de la Tour (inventor of the Siren—q.v.) have given valuable information on the

subject of vapors. He showed that when water, ether, and other liquids are hermetically sealed in glass tubes, so as to fill from a quarter to a half of the tube, the application of the requisite amount of heat is sufficient to convert the whole into vapor: this vapor, therefore, has a density equal to half or quarter of that of the liquid. Ordinary steam from boiling water has only about $\frac{1}{1700}$ of the density of water (in common language, a cubic inch of water gives a cubic foot of steam). These experiments are very dangerous. Some important experiments of this nature are due to Andrews. Having, by mere pressure, partially liquefied carbonic acid in a glass tube, he raised the temperature gradually, and observed that the demarkation between the liquid and the gas became less and less definite, the capillary curvature of the surface of the liquid also diminishing. At about 88° F. the liquid surface became horizontal, and the liquid disappeared. The tube then appeared filled with a homogeneous substance, neither gaseous nor liquid—apparently a new state of matter. When the temperature was slightly diminished, or the pressure relaxed, there was a singular appearance of flickering striæ, like those on mixing alcohol and water, or on looking through the column of irregularly heated air rising from a hot body. No pressure that Andrews could apply, not even 400 atmospheres, could liquefy this gas when its temperature was above 88° F. It appears that for every gas there is a point of temperature above which it is impossible by any amount of pressure to liquefy it.

The so-called permanent gases, oxygen, hydrogen, and nitrogen, through the patience and skill of Pictet of Geneva and Cailletet of Paris, have been liquefied or even solidified. Oxygen has been liquefied under a pressure of 500 atmospheres; hydrogen, under a pressure of 280 atmospheres; nitrogen, under a pressure of 200 atmospheres.

VAPOR-ENGINE: modification of the gas-engine, the power being produced by explosions of an inflammable vapor. The vapor-engine is operated by vapor drawn into the cylinder by the suction of the piston, and ignited by an electric spark. The process is as follows: a vessel called the carburetter contains a small quantity of gasoline, and is connected with the cylinder by a pipe. At each revolution of the fly-wheel a current of cool air is drawn through the carburetter and into the cylinder. In passing through the carburetter it vaporizes a quantity of the gasoline; this, when mixed with more air drawn through the pipe and air-valve, forms the charge which, on combustion, develops the power. This charge is drawn into the cylinder as the piston is drawn out by the crank and fly-wheel; on the return-stroke it is compressed in the head of the cylinder, and just before the piston arrives at its highest point, or 'upper dead-center,' a shoulder or point projecting from it (which is an elec-

trode) comes in contact with a flexible piece (also an electrode), the two comprising the poles of a small battery, thus completing an electric circuit, which is broken just as the piston, having passed its 'center,' begins to descend. At the instant when the electrodes separate, the spark is emitted, firing the charge. On every other stroke of the piston this is repeated automatically, except when the supply is cut off by the governor, which not only controls the engine, but at the same time cuts off the supply of vapor, so that when less power is being used proportionately less gas is consumed. With such an engine there is no fire-risk.

VAPOR MERCURY LAMP, The Hewitt: a novel form of electric lighting invented in 1902 by Peter Cooper Hewitt of New York. All other forms of artificial light now in practical use depend for their lighting properties upon the incandescence of a solid—usually carbon—either in the form of a filament or a rod, as in the ordinary glow lamp or the arc, or in a finely divided state, as in gas and kerosene lamps. The mercury vapor lamp, as its name implies, derives its light from the gas or vapor of mercury, in which the passage of an electric current causes a high state of incandescence. The lamp is constructed of a glass tube having a metal sealing-in wire at each end. These wires lead the current to the electrodes, one or both of which are of mercury. The tubes are exhausted to a high degree on a vacuum pump and sealed off. This prevents any escape of the vapor which fills the tube. One 330-watt Hewitt lamp will replace nine 32-candlepower incandescent lamps and give much more than twice the amount of light, using only one-third the current. Or the same lamp will replace 12 16-candlepower incandescent lamps, giving over three times the light for one-half the current. The light may be employed to great advantage for purposes where considerable illumination is required, and where the ordinary arc light is unsatisfactory on account of its sharp and heavy shadows and its flicker. Another great field of application of the lamp is for all sorts of photographic processes. The illumination being so diffused, and the light composed to a great extent of the so-called 'actinic' or chemically active rays, it furnishes for this work, where there has never been a satisfactory artificial illuminant, a perfect substitute for daylight. See also Electric Lighting.

VAQUERO, n. [Sp., a cowherd—from *vaca*, L. *vacca*, a cow]: a term applied in Mexico and the western states to one who has charge of cattle, horses or mules. A herdsman; a cowboy.

VAR, *vâr:* department in the extreme s.e. of France; bounded s. and s.e. by the Mediterranean, n.e. by the department of Alpes Maritimes (q.v.); 2,348 sq.m. The department, formed 1790 of part of Provence, receives its name from the river Var, formerly its e. boundary,

but since 1860 belonging wholly to the department of the Alpes Maritimes. Var is well watered by numerous streams, of which the chief are the Gapau, Argens, and Bianson. In the n. and n.e. it is mountainous, being traversed by a branch of the *Alpes de Provence*, called the Monts de l'Esterel. Between the mountains the water-courses give great fertility to many valleys. The climate, tempered by the altitude of the surface, is pleasant. Fruits of all kinds thrive; tobacco is grown; and the vine is extensively cultivated. The yield of wine 1884 was more than 7,000,000 gallons (reduced by the phylloxera from an average in the previous 10 years of about 29,000,000 gallons). There are numerous potteries. The department abounds in minerals. Commerce is active; exports being chiefly wine, fruits, olive-oil, and other agricultural and horticultural products. Var is divided into the three arrondissements, Draguignan, Brignoles, and Toulon; capital Draguignan. Pop. of department (1901) 326,380.

VARA, n. *văr'a:* a Spanish-American lineal measure, equal to about 32 or 33 inches.

VARANGIANS, *va-răn'jĭ-anz* (Ger. *Waräger* or *Wäringer*): Norman people of the Baltic coast, who in the 9th c. ravaged the coasts of the Baltic, and repeatedly subjugated the Slavic and Finnish peoples of n. and central Russia. They forced the Krivitches, Tschudes, and other tribes to pay tribute, and wrested from the Russians the districts now known as Revel, Petersburg, and Archangel. Gradually the two nations became intermixed, and the names Russian and Varangian appear to have been considered synonymous. In 862 the rulers of this Russo-Varangian nation, Rurik (q.v.), Sineous, and Truvor, were invited by the federative state of Novgorod, in which the Slavs were dominant, to put themselves at its head; and Rurik, accepting the invitation, founded the Russian monarchy (see RUSSIA). The Varangians were at first distinguishable in various ways above the other peoples of the Novgorod state; but, being far inferior in numbers, were soon forced to adopt the Slavic tongue, conform to Slavic manners, and so become merged in the predominant population. The great success which attended this experiment of the Novgorod confederacy induced other Slavic states, on the Dnieper, to put themselves under protection of the warlike Varangians; accordingly we find a second Slavic state at Kiev, under the rule of Oskold, a Varangian chief, conqueror of the barbarous Chazars. After Rurik's death, his successor in power, the regent Oleg, united Kiev to Novgorod, making Kiev the capital—which position it held till supplanted by Moscow (q.v.).

VARANIDÆ, *va-răn'ĭ-dē:* family of saurian reptiles, having a very elongated body, without dorsal crest; strong legs and long unequal toes; tail long and slightly compressed; scales tuberculous and arranged in rings;

tongue protractile, dividing into two points as in serpents. They belong to the sub-order *Pleurodonta*, and are confined to the e. hemisphere. Some are aquatic, and some inhabit dry and sandy places. The terrestrial species have the tail conical, the aquatic species compressed and often crested, so that it becomes a powerful organ of locomotion in water. The motion of the terrestrial species is aided by the tail, and is always serpentine. Some of the Varanidæ attain large size. They feed on animal food of any kind. The most noted species is the Monitor of Egypt, 5-6 ft. in length when of maximum growth; but, as usually seen, much less.

VAREC, n. *văr'ĕk* [F. *varech* (see WRACK 1)]: in the *Channel Islands*, sea-weeds dried and burned, or the carbonate of soda obtained therefrom; kelp.

VARESE, *vâ-rā'sā:* town of n. Italy, province of Como; 13 m. w. of the town of Como. It is a handsome town, with several fine palaces and magnificent villas; and manufactures silk, cotton, paper, and hats. Varese is of very ancient origin. The Romans kept it strongly garrisoned as a stronghold against invasion from the north. Pop. 12,600.

VARIABLE, VARIANCE, VARIANT, VARIATION, etc. See under VARY.

VARIABLE ERROR: the average departure from the average of a series of measurements, regardless of sign. Psychologists use the term mean variation (M.V.), which is identical with the mean error of the physical sciences. This error is found by taking the difference between each separate measurement and the average of them, and taking the average of these differences without reference to the signs (Cattell). Thus, in measuring the illusion of the vertical (see CONSTANT ERROR), the average illusion found in fifty measurements may be 7 per cent of the distance measured; to show the reliability of that measurement the record is stated thus: (50 trials) Ave., 7.0 per cent; M.V., 1.4 per cent. See OBSERVATION, ERRORS OF.

VARIATION: this term as used in biology involves the fact that things of similar origin are not identical in size, form, proportion, color, habit, etc. No two living things are exactly alike in all respects. The similarity of origin may be of very different degrees. It may refer to co-ordinate parts or organs of the same plant or animal body, to the members of a single family, or of larger related groups, such as varieties, species, genera, etc. Until Darwin's time variations were rarely noticed unless they were so considerable in extent as to constitute abnormalities, and then they were looked upon and noted simply as curiosities. The whole trend of biological study previous to that time was directed toward the arrangement of all plants and animals into groups supposed to be eternally changeless. With the growth of

the evolutionary conception of species, variability became a subject of the most vital importance, since all progress in evolution must result in some way from the variability of organisms.

Variations may be due to the combined action of several or many different causes, some external or environmental, others internal. They may be wholly independent of each other or associated more or less definitely in groups. They may be transmissible to all the offspring or to none of them, or show every intermediate grade of heritability in different cases. From all these considerations it follows that variations are of such diverse kinds that they may be classified and advantageously considered under a number of different heads, because of the different properties displayed by each several kind.

Variations in the homologous parts of single individuals are often spoken of as partial variations, because the whole individual is not involved, as when some leaves of a plant are variegated and others green. Such partial variations, when of a striking character, are usually called sports or abnormalities (see TERATOLOGY). The same terms are not infrequently applied to unusual characters affecting whole individuals, particularly when it is assumed or can be shown that they are not perfectly inheritable (see EVER-SPORTING VARIETIES). Any variation that is fully heritable is called a mutation, and it is held by many biologists at present that this is the only kind of variation which results in the production of new species (see MUTATION). Sports and mutations appear infrequently. They have also been called 'chance' variations to denote that their cause is unknown, but this terminology is unfortunate, since it has been shown that the usual relatively slight variations characteristic of all living things follow the laws of chance, while these relatively rare abnormalities and mutations to which the term 'chance variation' is applied do not follow those laws so far as now known.

Variations affecting individuals, and assumed or shown not to be completely and continuously heritable, are called individual variations or fluctuations. These fluctuating variations follow the laws of chance (see CHANCE). This was first fully demonstrated by Quetelet, followed shortly by Galton, and the study of such variations has recently developed into an important field of scientific inquiry based upon the development of the mathematical theory of probabilities, mainly at the hands of Pearson and his students (see BIOMETRY). This involves the counting or measuring of variable characters, arranging the values found into classes to form curves, and calculating the mathematical relations of the curves so formed. By comparing the functions of these various curves many relations are discovered which can not be derived in any other way. No organism is free from these fluctuating variations in any organ or character. The recognition of this fact by Darwin gave the basis for his explanation of

the origin of species by natural selection, and it is because of the relation of variability to the problems of evolution that its study has become so important.

When differences between homologous characters of an individual are seen to follow any definite law of change, in relation to their time or place of origin, such characters are said to be differentiated (see DIFFERENTIATION). The same term is used to indicate that with respect to any one or more characters, different groups of individuals having a common origin, differ from each other in their variability by more than could be expected if they were random samples from a population having a uniform degree of variability of each character in question.

Differentiation is the rule as regards the variation in repeated characters, as, for instance, the legs of a centipede or the leaves of a tree, and this differentiation is such that the value of the characters usually begins low at the beginning of development or at one end of the series and increases to a maximum, then decreases toward the close of development (see PERIODICITY). Sometimes a character begins at its minimum value and increases regularly to a maximum, not followed by a decrease.

When different characters are found to be so related that an increase in the value of one is usually accompanied by an increase or by a decrease in another, they are said to be correlated. When two organs or characters increase and decrease together the correlation is positive; when one increases as the other decreases the correlation is negative. Positive correlation of variable characters is almost a universal phenomenon, since this is the only way in which any stability of proportion and symmetry could result (see CORRELATION).

The inheritance of a particular abmodal value of any fluctuating character is never complete, the departure of the mean condition of the offspring from the mean of the selected parents toward the mean condition of the race out of which they were selected being called 'regression' (see REGRESSION AND GALTON'S LAW). This regression, or return toward the mean of the unselected race, results in the loss within several generations after selection ceases of all of the peculiarities which distinguished the selected parents from their fellows. Such complete loss of distinctive characters leads to the belief, which grows as the behavior of fluctuations is more fully investigated, that fluctuations can not give rise to any permanent modification and therefore have no influence in the origin of new species.

The systematic study of variations by quantitive methods has led to the discovery of many important relations or laws. Some of these rest as yet upon too slight data and must be considered hypothetical until further studies lead to their confirmation. It appears that the most potent factor controlling changes in vari-

ernment inspector-general of public instruction 1877; decorated with the cross of the Legion of Honor 1878.

VAPID, a. *văp'ĭd* [L. *vapĭdus*, flat or stale; *vappa*, palled flat wine: allied to *vapor*, steam, exhalation]: that has lost its life and spirit, as by evaporation; spiritless; flat; dull; mawkish; insipid. VAP'IDLY, ad. *-lĭ*. VAP'IDNESS, n. *-nĕs*, or VAPIDITY, n. *vă-pĭd'ĭ-tĭ*, want of life or spirit; deadness; flatness.

VAPOR, n. *vā'pĕr* [F. *vapeur*—from L. *vapor* or *vapōrem*, steam, exhalation]: the elastic aeriform fluid into which most liquids and many solids may be converted by heat, generally invisible; a visible fluid floating in the atmosphere; *figuratively*, something vain or unsubstantial: V. to be exhaled; give out vapor or steam; boast; to brag; to bully. VA'PORS, n. plu. *-pĕrz*, in *OE.*, a name given to a disease characterized by nervous weakness and depression of spirits, in which a variety of strange images float in the brain or appear as real and visible; hysteria; also, a name applied to the empty boasts and talk of a bully. VA'PORED, a. *-pĕrd*, moist; in *OE.*, peevish. VA'PORER, n. *-pĕr-ĕr*, one who makes a vaunting display of his prowess or worth; a braggart. VA'PORING, a. boasting ostentatiously. VA'PORISH, a. *-ĭsh*, affected by hysterics or the disease called vapors. VA'PORISHNESS, n. *-nĕs*, the state or quality of being vaporish. VA'PORY, a. *-ĭ*, full of vapors; in *OE.*, peevish. VA'PORABLE, a. *-ă-bl*, capable of being converted into vapor. VA'PORABIL'ITY, n. *-ă-bĭl'ĭ-tĭ*, quality of being vaporable. VA'PORIZE, v. *-īz*, to convert into vapor. VA'PORIZING, imp. VA'PORIZED, pp. *-īzd*. VA'PORIZA'TION, n. *-ī-zā'shŭn*, the rapid conversion of a fluid into vapor by heat. VA'POROUS, a. *-ŭs*, of or pertaining to vapor; full of vapors or exhalations; proceeding from the disease called vapors. VA'POROUSNESS, n. *-nĕs*, state of being vaporous. VA'PORIF'EROUS, a. *-ĭf'ĕr-ŭs* [L. *fero*, I bear]: bearing or forming vapor. VA'PORIF'IC, a. *-ĭf'ĭk* [L. *facĕrĕ*, to make]: that converts or has the power of converting into vapor or steam. VAPOR-BATH, the application of vapor to the body in a close place; the bath itself.—A *Vapor* is really a gas. As all *solids* except carbon (an exception due probably to our inability to produce a sufficiently high temperature) are melted, or rendered *liquid* by Heat (q.v.), so a further application of heat converts them into *vapor* or gas. That a vapor is a gas is best shown, perhaps, by the beautiful experiments of Faraday (q.v.) and others on the liquefaction of gases. Hydrogen, oxygen, and nitrogen long were exceptions; but now all gases have been liquefied by a proper application of pressure or cold, or of cold and pressure combined. The difference between a vapor and a gas, as these words are used in common speech, is this: a gas is a substance which at ordinary temperatures and pressures exists in a state of vapor, while a vapor is produced by application of heat to a substance found ordinarily in the solid or liquid

form; in other words, gases are the vapors of substances which, in their liquid form, boil at very low temperatures.

The most familiar instance of vapor is aqueous vapor, or Steam (q.v.). At all temperatures, even as low as the freezing-point, ice and water give off vapor, and the quantity produced is determined by the temperature alone—i.e., Evaporation (q.v.) at any temperature continues (more or less slowly, according to the quantity of air or other gas which is present) until the pressure exerted by the vapor on the containing vessel attains a certain definite value, depending on the temperature alone. If the temperature be such that the corresponding vapor-pressure is equal to the pressure of the air, vapor comes off freely, and we have the phenomenon called boiling.

Vapor in a vessel which contains some unevaporated water is thus always *saturated*—i.e., the full amount of vapor capable of existing at the temperature of the vessel is present. If it be compressed, some is liquefied; if allowed to expand, more vapor is formed. If, however, there be no water present in the liquid form, and the temperature be gradually raised the pressure of the vapor will rise, but much more slowly than when water is present, because no more vapor can be formed: in this state, that of *superheated* steam, vapor behaves almost exactly as an ordinary gas.

Chlorine, carbonic acid, sulphurous acid, etc., thus exist at ordinary temperatures as *superheated* vapors; and can therefore be reduced by cold and pressure to the condition of *saturated* vapor, when they are easily liquefied by carrying the process further.

Aqueous vapor may be liquefied by cold alone, or by pressure alone, as we have seen; and at ordinary temperatures it is easy to liquefy sulphurous acid, ammonia, and even carbonic acid and laughing-gas, by mere compression. Gases absorbed by charcoal or by spongy platinum—i.e., condensed by intense molecular forces on the large surface presented by the interstices in these bodies—must in all probability exist in the state of liquids. Carbonic acid is liquefied when exposed to a pressure of 35 atmospheres at ordinary temperatures; and some varieties of charcoal absorb from 80 to 100 times their bulk of this gas. Remembering that, on account of the impenetrability of matter, the gas can be only in the *pores* of the charcoal, and that their whole bulk is but a small fraction of that of the charcoal itself, we see that probably the absorbed gas must be condensed so enormously as to have become liquid. It is probable that, in Graham's process for separating by dialysis (see Osmose) the oxygen and nitrogen of the atmosphere, the film of vulcanized India-rubber employed as septum compels these gases to pass through its pores in a liquid form.

Experiments by Cagniard de la Tour (inventor of the Siren—q.v.) have given valuable information on the

subject of vapors. He showed that when water, ether, and other liquids are hermetically sealed in glass tubes, so as to fill from a quarter to a half of the tube, the application of the requisite amount of heat is sufficient to convert the whole into vapor: this vapor, therefore, has a density equal to half or quarter of that of the liquid. Ordinary steam from boiling water has only about $\frac{1}{1700}$ of the density of water (in common language, a cubic inch of water gives a cubic foot of steam). These experiments are very dangerous. Some important experiments of this nature are due to Andrews. Having, by mere pressure, partially liquefied carbonic acid in a glass tube, he raised the temperature gradually, and observed that the demarkation between the liquid and the gas became less and less definite, the capillary curvature of the surface of the liquid also diminishing. At about 88° F. the liquid surface became horizontal, and the liquid disappeared. The tube then appeared filled with a homogeneous substance, neither gaseous nor liquid—apparently a new state of matter. When the temperature was slightly diminished, or the pressure relaxed, there was a singular appearance of flickering striæ, like those on mixing alcohol and water, or on looking through the column of irregularly heated air rising from a hot body. No pressure that Andrews could apply, not even 400 atmospheres, could liquefy this gas when its temperature was above 88° F. It appears that for every gas there is a point of temperature above which it is impossible by any amount of pressure to liquefy it.

The so-called permanent gases, oxygen, hydrogen, and nitrogen, through the patience and skill of Pictet of Geneva and Cailletet of Paris, have been liquefied or even solidified. Oxygen has been liquefied under a pressure of 500 atmospheres; hydrogen, under a pressure of 280 atmospheres; nitrogen, under a pressure of 200 atmospheres.

VAPOR-ENGINE: modification of the gas-engine, the power being produced by explosions of an inflammable vapor. The vapor-engine is operated by vapor drawn into the cylinder by the suction of the piston, and ignited by an electric spark. The process is as follows: a vessel called the carburetter contains a small quantity of gasoline, and is connected with the cylinder by a pipe. At each revolution of the fly-wheel a current of cool air is drawn through the carburetter and into the cylinder. In passing through the carburetter it vaporizes a quantity of the gasoline; this, when mixed with more air drawn through the pipe and air-valve, forms the charge which, on combustion, develops the power. This charge is drawn into the cylinder as the piston is drawn out by the crank and fly-wheel; on the return-stroke it is compressed in the head of the cylinder, and just before the piston arrives at its highest point, or 'upper dead-center,' a shoulder or point projecting from it (which is an elec-

trode) comes in contact with a flexible piece (also an electrode), the two comprising the poles of a small battery, thus completing an electric circuit, which is broken just as the piston, having passed its 'center,' begins to descend. At the instant when the electrodes separate, the spark is emitted, firing the charge. On every other stroke of the piston this is repeated automatically, except when the supply is cut off by the governor, which not only controls the engine, but at the same time cuts off the supply of vapor, so that when less power is being used proportionately less gas is consumed. With such an engine there is no fire-risk.

VAPOR MERCURY LAMP, The Hewitt: a novel form of electric lighting invented in 1902 by Peter Cooper Hewitt of New York. All other forms of artificial light now in practical use depend for their lighting properties upon the incandescence of a solid—usually carbon—either in the form of a filament or a rod, as in the ordinary glow lamp or the arc, or in a finely divided state, as in gas and kerosene lamps. The mercury vapor lamp, as its name implies, derives its light from the gas or vapor of mercury, in which the passage of an electric current causes a high state of incandescence. The lamp is constructed of a glass tube having a metal sealing-in wire at each end. These wires lead the current to the electrodes, one or both of which are of mercury. The tubes are exhausted to a high degree on a vacuum pump and sealed off. This prevents any escape of the vapor which fills the tube. One 330-watt Hewitt lamp will replace nine 32-candlepower incandescent lamps and give much more than twice the amount of light, using only one-third the current. Or the same lamp will replace 12 16-candlepower incandescent lamps, giving over three times the light for one-half the current. The light may be employed to great advantage for purposes where considerable illumination is required, and where the ordinary arc light is unsatisfactory on account of its sharp and heavy shadows and its flicker. Another great field of application of the lamp is for all sorts of photographic processes. The illumination being so diffused, and the light composed to a great extent of the so-called 'actinic' or chemically active rays, it furnishes for this work, where there has never been a satisfactory artificial illuminant, a perfect substitute for daylight. See also Electric Lighting.

VAQUERO, n. [Sp., a cowherd—from *vaca*, L. *vacca*, a cow]: a term applied in Mexico and the western states to one who has charge of cattle, horses or mules. A herdsman; a cowboy.

VAR, *vâr:* department in the extreme s.e. of France; bounded s. and s.e. by the Mediterranean, n.e. by the department of Alpes Maritimes (q.v.); 2,348 sq.m. The department, formed 1790 of part of Provence, receives its name from the river Var, formerly its e. boundary,

but since 1860 belonging wholly to the department of the Alpes Maritimes. Var is well watered by numerous streams, of which the chief are the Gapau, Argens, and Bianson. In the n. and n.e. it is mountainous, being traversed by a branch of the *Alpes de Provence*, called the Monts de l'Esterel. Between the mountains the water-courses give great fertility to many valleys. The climate, tempered by the altitude of the surface, is pleasant. Fruits of all kinds thrive; tobacco is grown; and the vine is extensively cultivated. The yield of wine 1884 was more than 7,000,000 gallons (reduced by the phylloxera from an average in the previous 10 years of about 29,000,000 gallons). There are numerous potteries. The department abounds in minerals. Commerce is active; exports being chiefly wine, fruits, olive-oil, and other agricultural and horticultural products. Var is divided into the three arrondissements, Draguignan, Brignoles, and Toulon; capital Draguignan. Pop. of department (1901) 326,380.

VARA, n. *văr'a:* a Spanish-American lineal measure, equal to about 32 or 33 inches.

VARANGIANS, *va-răn'jĭ-anz* (Ger. *Waräger* or *Wäringer*): Norman people of the Baltic coast, who in the 9th c. ravaged the coasts of the Baltic, and repeatedly subjugated the Slavic and Finnish peoples of n. and central Russia. They forced the Krivitches, Tschudes, and other tribes to pay tribute, and wrested from the Russians the districts now known as Revel, Petersburg, and Archangel. Gradually the two nations became intermixed, and the names Russian and Varangian appear to have been considered synonymous. In 862 the rulers of this Russo-Varangian nation, Rurik (q.v.), Sineous, and Truvor, were invited by the federative state of Novgorod, in which the Slavs were dominant, to put themselves at its head; and Rurik, accepting the invitation, founded the Russian monarchy (see RUSSIA). The Varangians were at first distinguishable in various ways above the other peoples of the Novgorod state; but, being far inferior in numbers, were soon forced to adopt the Slavic tongue, conform to Slavic manners, and so become merged in the predominant population. The great success which attended this experiment of the Novgorod confederacy induced other Slavic states, on the Dnieper, to put themselves under protection of the warlike Varangians; accordingly we find a second Slavic state at Kiev, under the rule of Oskold, a Varangian chief, conqueror of the barbarous Chazars. After Rurik's death, his successor in power, the regent Oleg, united Kiev to Novgorod, making Kiev the capital—which position it held till supplanted by Moscow (q.v.).

VARANIDÆ, *va-răn'ĭ-dē:* family of saurian reptiles, having a very elongated body, without dorsal crest; strong legs and long unequal toes; tail long and slightly compressed; scales tuberculous and arranged in rings;

tongue protractile, dividing into two points as in serpents. They belong to the sub-order *Pleurodonta*, and are confined to the e. hemisphere. Some are aquatic, and some inhabit dry and sandy places. The terrestrial species have the tail conical, the aquatic species compressed and often crested, so that it becomes a powerful organ of locomotion in water. The motion of the terrestrial species is aided by the tail, and is always serpentine. Some of the Varanidæ attain large size. They feed on animal food of any kind. The most noted species is the Monitor of Egypt, 5-6 ft. in length when of maximum growth; but, as usually seen, much less.

VAREC, n. *văr'ĕk* [F. *varech* (see WRACK 1)]: in the *Channel Islands*, sea-weeds dried and burned, or the carbonate of soda obtained therefrom; kelp.

VARESE, *vâ-rā'sā:* town of n. Italy, province of Como; 13 m. w. of the town of Como. It is a handsome town, with several fine palaces and magnificent villas; and manufactures silk, cotton, paper, and hats. Varese is of very ancient origin. The Romans kept it strongly garrisoned as a stronghold against invasion from the north. Pop. 12,600.

VARIABLE, VARIANCE, VARIANT, VARIATION, etc. See under VARY.

VARIABLE ERROR: the average departure from the average of a series of measurements, regardless of sign. Psychologists use the term mean variation (M.V.), which is identical with the mean error of the physical sciences. This error is found by taking the difference between each separate measurement and the average of them, and taking the average of these differences without reference to the signs (Cattell). Thus, in measuring the illusion of the vertical (see CONSTANT ERROR), the average illusion found in fifty measurements may be 7 per cent of the distance measured; to show the reliability of that measurement the record is stated thus: (50 trials) Ave., 7.0 per cent; M.V., 1.4 per cent. See OBSERVATION, ERRORS OF.

VARIATION: this term as used in biology involves the fact that things of similar origin are not identical in size, form, proportion, color, habit, etc. No two living things are exactly alike in all respects. The similarity of origin may be of very different degrees. It may refer to co-ordinate parts or organs of the same plant or animal body, to the members of a single family, or of larger related groups, such as varieties, species, genera, etc. Until Darwin's time variations were rarely noticed unless they were so considerable in extent as to constitute abnormalities, and then they were looked upon and noted simply as curiosities. The whole trend of biological study previous to that time was directed toward the arrangement of all plants and animals into groups supposed to be eternally changeless. With the growth of

the evolutionary conception of species, variability became a subject of the most vital importance, since all progress in evolution must result in some way from the variability of organisms.

Variations may be due to the combined action of several or many different causes, some external or environmental, others internal. They may be wholly independent of each other or associated more or less definitely in groups. They may be transmissible to all the offspring or to none of them, or show every intermediate grade of heritability in different cases. From all these considerations it follows that variations are of such diverse kinds that they may be classified and advantageously considered under a number of different heads, because of the different properties displayed by each several kind.

Variations in the homologous parts of single individuals are often spoken of as partial variations, because the whole individual is not involved, as when some leaves of a plant are variegated and others green. Such partial variations, when of a striking character, are usually called sports or abnormalities (see TERATOLOGY). The same terms are not infrequently applied to unusual characters affecting whole individuals, particularly when it is assumed or can be shown that they are not perfectly inheritable (see EVER-SPORTING VARIETIES). Any variation that is fully heritable is called a mutation, and it is held by many biologists at present that this is the only kind of variation which results in the production of new species (see MUTATION). Sports and mutations appear infrequently. They have also been called 'chance' variations to denote that their cause is unknown, but this terminology is unfortunate, since it has been shown that the usual relatively slight variations characteristic of all living things follow the laws of chance, while these relatively rare abnormalities and mutations to which the term 'chance variation' is applied do not follow those laws so far as now known.

Variations affecting individuals, and assumed or shown not to be completely and continuously heritable, are called individual variations or fluctuations. These fluctuating variations follow the laws of chance (see CHANCE). This was first fully demonstrated by Quetelet, followed shortly by Galton, and the study of such variations has recently developed into an important field of scientific inquiry based upon the development of the mathematical theory of probabilities, mainly at the hands of Pearson and his students (see BIOMETRY). This involves the counting or measuring of variable characters, arranging the values found into classes to form curves, and calculating the mathematical relations of the curves so formed. By comparing the functions of these various curves many relations are discovered which can not be derived in any other way. No organism is free from these fluctuating variations in any organ or character. The recognition of this fact by Darwin gave the basis for his explanation of

the origin of species by natural selection, and it is because of the relation of variability to the problems of evolution that its study has become so important.

When differences between homologous characters of an individual are seen to follow any definite law of change, in relation to their time or place of origin, such characters are said to be differentiated (see DIFFERENTIATION). The same term is used to indicate that with respect to any one or more characters, different groups of individuals having a common origin, differ from each other in their variability by more than could be expected if they were random samples from a population having a uniform degree of variability of each character in question.

Differentiation is the rule as regards the variation in repeated characters, as, for instance, the legs of a centipede or the leaves of a tree, and this differentiation is such that the value of the characters usually begins low at the beginning of development or at one end of the series and increases to a maximum, then decreases toward the close of development (see PERIODICITY). Sometimes a character begins at its minimum value and increases regularly to a maximum, not followed by a decrease.

When different characters are found to be so related that an increase in the value of one is usually accompanied by an increase or by a decrease in another, they are said to be correlated. When two organs or characters increase and decrease together the correlation is positive; when one increases as the other decreases the correlation is negative. Positive correlation of variable characters is almost a universal phenomenon, since this is the only way in which any stability of proportion and symmetry could result (see CORRELATION).

The inheritance of a particular abmodal value of any fluctuating character is never complete, the departure of the mean condition of the offspring from the mean of the selected parents toward the mean condition of the race out of which they were selected being called 'regression' (see REGRESSION AND GALTON'S LAW). This regression, or return toward the mean of the unselected race, results in the loss within several generations after selection ceases of all of the peculiarities which distinguished the selected parents from their fellows. Such complete loss of distinctive characters leads to the belief, which grows as the behavior of fluctuations is more fully investigated, that fluctuations can not give rise to any permanent modification and therefore have no influence in the origin of new species.

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building, Strong hall, Raymond house, Edward Lathrop hall, and Eliza Davison house (four dormitories), Rockefeller hall (containing the recitation rooms and two auditorium halls), Vassar Brothers Laboratory (chemistry and physics), the New England building (biology, geology, and physiology), the museum (art gallery and music rooms), the observatory, the infirmary, and the Alumnæ gymnasium. A certain amount of gymnasium work is required of all students, and outdoor sports are encouraged; an annual field-day is held. The chapel, gift of Mrs. Mary Thaw Thompson (1877) and Mrs. Mary Morris Pratt (1880), was completed in 1904, June, and accommodates an audience of 1,300. A splendid new library building was dedicated in 1905, gift of Mrs. Frederick Ferris Thompson as a memorial to her husband, who was a trustee of the college and one of its chief benefactors. The library contains over 50,000 volumes; the students number about 1,000, and there are 90 in the faculty.

VAST, a. *vâst* [F. *vaste*, vast—from L. *vastus*, desolate, immense: It. *vasto:* see also *waste*, from the same root]: of great extent; very great in bulk, amount, numbers, force, or importance; very spacious; immense; in *OE.*, void; waste: N. that which is immeasurable; space. VAST'LY, ad. *-lĭ.* VAST-NESS, n. *-nĕs*, immense bulk or extent; immensity; greatness. VAST'Y, a. immense; mighty; enormously great. VASTIDITY, n. *văs-tĭd'ĭ-tĭ*, in *OE.*, immensity.—SYN. of 'vast'; huge; enormous; prodigious; mighty.

VASUDE'VA AND VASUDE'VA. See VISHN'U.

VAT, n. *văt* [AS. *fæt;* Dut. *vat;* Dan. *fad;* Icel. *fat;* Ger. *fass*, a tub, a vessel for holding liquids]: a large vessel or cask for holding liquids, particularly fermented liquors, in an immature state; a large vessel or cistern for steeping hides in: V. to put or pour into a vat. VAT'TING, imp. VAT'TED, pp.

VATE'RIA: genus of plants to which the tallow-tree belongs. See TALLOW-TREE.

VATIC, a. *văt'ĭk* [L. *vatēs*, a bard or prophet]: affected by supernatural influence; prophetic.

VATICAN, n. *văt'ĭ-kăn* [L. *mons vatĭcānus*, the Vatican Hill, in Rome, on the western bank of the Tiber]: the assemblage of buildings, adjoining the Church of St. Peter in Rome, which forms the pope's palace; hence, the papal authority or government. VATICANISM, n. *văt'ĭ-kăn-ĭzm*, the papal system of rule and religious obligations; the theological and ecclesiastical system based on the doctrine of papal infallibility and absolute papal supremacy; ultramontanism. VAT'ICANIST, n. *-ĭst*, an ultramontanist. THUNDERS OF THE VATICAN, the anathemas or denunciations of the pope.

VAT'ICAN, COUNCIL OF THE: assembly of the bishops of the Rom. Cath. Chh., in the Vatican Palace, Rome, 1869, Dec. 8. The papal bull of Pius IX. convoking the

Vatican Council was issued 1869, June 29; but the previous Sep. the pope had invited to attend 'all bps. of the churches of oriental rite not in communion with the apostolic see,' and all 'Protestants and non-Catholics;' but neither the separated orientals nor the Protestants were to have any voice whatever in the council; and in a letter to Card. Manning the pope wrote that the Protestants were invited to attend only that they might be referred to 'experienced men' for solution of their difficulties. Naturally, no bp. of any separate oriental chh. nor any Protestant responded to the invitation. Pius IX. had for many years meditated the calling of the council, and had sounded his bps. throughout the world to learn how they were disposed toward the convocation of a general council. Early in 1865 preliminary work toward preparing the subject-matters of the council was begun, and a 'congregation of direction' was named from the College of Cardinals; theologians were chosen from different countries as consulters to the preliminary congregations: all this in the strictest confidence. All the bps. of the chh. were formally invited 1867, June 4, to be present in Rome at the centenary of the martyrdom of Peter and Paul: those who attended were asked to give suggestions on sundry points of discipline and other matters later to come before the council. In addition to the 'congregation of general direction,' 6 special congregations were instituted 1869, June—viz., for 'ceremonial,' 'church and state,' 'oriental churches,' 'religious orders,' 'dogmatic theology,' 'discipline:' the members were ecclesiastics from all parts of the world, with cardinals as chairmen. That the question of papal infallibility was to come before the council, there was no authoritative announcement, public or private, till the council met; but 1869, Feb. 6, in the semi-official *Civiltà Cattolica*, a correspondent declared that the council would declare the pope infallible. The German bps., in council at Fulda 1869, Sept., took alarm at this announcement, and expressed their fears of consequences should papal infallibility be made an article of faith. The 'order of business' of the council was promulgated 1869, Nov. 27; commissions were at the same time named to discuss suggestions offered by bps.; drafts (*schemata*) were prepared of the decrees proposed to be adopted by the council. When the council opened, 719 members were present; the largest number present at any session was 764, all bps., abps., patriarchs, etc., except 52 who were abbots, generals of orders, etc. But of the bps. 120 were of titles *in partibus infidelium*. There was in the council some discussion of matters of discipline, but that had no definitive outcome. The real occupation of the council was with matters—or rather with a matter—of dogma; the whole completed result is found in the two 'constitutions,' as they are called—one, *De Fide Catholica*, an exposition of points of faith that no one in the chh., whether in the council or out of it, ever questioned; the

other, *De Ecclesia Christi:* in this is embodied the definition of the pope's infallibility. The first constitution was adopted without delay and unanimously by 667 voices. The second was a subject of impassioned discussion till the very last day of the sittings. In 1870, Jan., 45 German and Austrian bps., 32 French, 3 Portuguese, 4 oriental, 7 Italian, 27 Anglic (i.e., from English-speaking countries), begged the pope to have the dogma withdrawn; the protest was strongly supported from outside by the govts. of France, Austria, Bavaria, Portugal, Prussia; and many very distinguished members of the council—e.g., Manning (Westminster), Spalding (Baltimore), Strossmayer of Slavonia, Rauscher (Vienna), Darboy (Paris), Dupanloup (Orleans), Kenrick (St. Louis), besides signing the petition, took an active part in organizing the opposition. When the constitution as it stands was read in council (July 13), 451 members voted *placet* (i.e., yea), 62 *placet juxta modum* (yea, provided certain changes were made in phraseology); 88 *non placet* (i.e., nay); 70 abstained from voting. July 18 the constitution came up for a final vote, and there were 535 yeas, a gain of 84 on the vote of 5 days before; this gain, no doubt, came mainly from the middle faction, who had then voted *placet secundum modum*, and in part from the absent or non-voting 70. The opposition (*non-placet* faction) was nowhere visible at the close of the battle. Of the 88 who formed its voting strength July 13, only 2 stood in their place July 18. These were Edward Fitzgerald, Bp. of Little Rock, Ark. (b. Limerick, Ireland, 1834), and Riccio, Bp. of Ajaccio. The council was prorogued Sep. 20.

VAT'ICAN, PALACE OF THE: residence of the pope in Rome, and seat of the great library, museums, and art-collections, ancient and modern, which, for visitors, constitute one of the chief attractions of that city. The popes, very soon after the establishment of the peace of the church under Emperor Constantine, had a residence at the Vatican, which they occupied jointly with that of the Lateran. After the mediæval period, Nicholas V. began that systematic scheme for improvement and embellishment of the Vatican which has resulted in what, taken altogether, may be regarded as the noblest of princely residences. Alexander VI., Julius II., and, above all, Leo X., pursued the same plan; and there are very few of the succeeding popes who have not had a share in the enlargement or embellishment of the Vatican. Amid all the difficulties, financial and political, of his pontificate, Pius IX. carried out many tasteful works of completion or restoration, the most striking and effective of which is the great stair by which it is approached from the colonnade of St. Peter's. The building, with its gardens and other appurtenances, is said to cover a space equal to the whole area of the city of Turin, as it was about 1747, with a pop. of 130,000. It is popularly be-

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VATTEL, *vât-tĕl',* EMERICH DE: writer on international law: 1714, Aug. 25—1767, Dec. 20; b. Couvet, in Neufchâtel; son of a Prot. clergyman who had been ennobled by the king of Prussia, whose subject he was. Vattel studied for the ministry at Bâle and Geneva, but he gave more attention to the writings of Leibnitz and

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VAUBAN, *vō-bŏng'*, Sebastien le Prestre de, Marshal of France; renowned military engineer: 1633, May 15—1707, Mar. 30; b. at Saint Leger de Fougeret, department of Nièvre. He was left an almost destitute orphan at the age of ten, and his education was under the auspices of the *curé* of his village. Leaving Saint Leger 1651, he set out on foot to join Condé's army on the Belgian frontier. Taken prisoner 1653, he joined the royalists, and during the succeeding contest was attached mostly to the army of Turenne, in which his engineering work gained him high repute. In 1667 he appeared again in the north, capturing one after another the strong defenses of the Belgian frontier. About this period, Vauban's probity and punctuality, no less than his genius, charmed the powerful Louvois, who appointed him to the honorable work of fortifying the Flemish strongholds which had fallen into the possession of France. In the war with Holland, Vauban took his old place as director of siege operations, and introduced into practice in w. Europe the method of approach by parallels (recently borrowed from the Turks), at the siege of Maestricht (1673); and with such effect that that strong fortress capitulated in 13 days. In 1676 he conducted the remarkable sieges of Valenciennes and Cambrai;

stormed the latter in open day, against the unanimous opinion of the generals of the army; and two years later was rewarded for his long and glorious services by the appointment of director-general of fortifications, with supreme control of the department of military engineering. Vauban surrounded France with a cordon of fortresses; he also captured the almost impregnable fortress of Luxembourg, and planned the magnificent aqueduct of Maintenon, conveying the waters of the Eure to Versailles.

In the war which broke out 1688, Vauban conducted the sieges of Philipsburg, Mannheim, and Frankenthal (introducing, at the last, his invention of ricochet firing), Mons (1691), and Namur (1692), with his usual success. After this period, Vauban produced few professional works of importance. After the peace of Ryswick 1697, he applied his practical mind to the various deficiencies and anomalies in the internal government of France; and one of his works, *Dîme Royale* (1707), excited an immense sensation by his discussion of taxation, in which he anticipated the doctrines, which a century later, overthrew the French monarchy. Vauban lost favor with the king, and his book was seized and confiscated. He died at Paris.—Fontenelle calculates that Vauban had constructed 33 new fortresses, repaired 300 old ones, conducted 53 sieges, and had been present at 140 'actions of vigor'; and in his practice the capture of a fortress was certainly a mere question of time and powder.—See his professional works, *Œuvres Militaires* (Paris 1796). See *Nouvelle Biographie Générale.*

VAUCLUSE, *vō-klüz':* department in s.e. France, bounded w. by the Rhone, s. by the Durance, which separates it from the department of Bouches-du-Rhone; 1,273 sq.m. The Rhone is the great river, and its affluents, except the Durance, are small. The department is traversed in the e. by spurs of the Alps. The plains are in the w.—the chief being those of Orange, Carpentras, and Cavaillon. In the e., the mountains are separated by narrow, torrent-plowed valleys; and the summits, the chief of which is Mont Ventoux, 6,273 ft. high, are arid and bare. The climate is healthful and temperate, though subject to great variations—the winds from the n. and n.e. being sometimes violent. Vaucluse, though more agricultural than manufacturing, does not produce cereals largely; but the peach, pear, prune, almond, and fig trees thrive; and olive, mulberry, and orange trees abound. Wines and honey of fine quality are produced. There are four arrondissements—Avignon, Apt, Carpentras, and Orange. Avignon is the capital. Population of department (1901) 236,949.

VAUD, *vō* (Ger. *Waadt*): canton in w. Switzerland, between the Jura and the Bernese Alps; 1,244 sq.m. Vaud is the third in population among Swiss cantons. It is comparatively level, but is traversed by an elevated

tract, known as Mt. Jorat, from which plains slope to the Lake of Geneva on the s., and the Lake of Neufchâtel on the n. On both sides, near the mountains, are extensive pasture-lands, but the greater part of the country is highly cultivated. The orchards and vineyards are very extensive, the latter yielding excellent white wines. There are no manufactures of importance. Vaud is traversed by railways, which connect it in two directions with France, and in three, with the rest of Switzerland. It forms part of French Switzerland, the dialect spoken being the Vaudois. The religion is Protestant. Since 1830 Vaud has been a democratic republic, the council of the canton being elected and controlled by the people. After the fall of the Roman empire, Vaud formed part of the Burgundian kingdom. In the 13th century it became a dependency of Savoy, to which it was annexed 1359. In 1476 the House of Savoy took part with the Duke of Burgundy in his struggle with the Swiss; and on his defeat a part of Vaud was annexed to the adjoining cantons. In 1536 the Bernese took possession of the whole of Vaud, which they divided into 15 parts, administered by *baillis*, appointed at Bern. The nobility became patricians of Bern, and thus acquired great influence. Still, the local councils had the power of appointing magistrates and administrative officers, which tempered the aristocratic character of the government. The French invasion put an end to the rule of Bern, and Vaud became a separate canton. The government remained in the hands of the higher classes until 1830, June, when a new constitution, granting a vote to every adult *bourgeois* of good character, was obtained from the council. The existing democratic-representative constitution dates from 1845, but was revised 1861. The Vaudois are industrious and well educated. Capital, Lausanne. Population of Vaud (1900) 281,379.

VAUDEVILLE, n. *vōd'vĭl* [F.—a corruption of the name *Vaux-de-Vire*, in Normandy, where lived about the middle of the 15th century Olivier Basselin, a satirical poet, whose drinking-songs, known as *Les Vaux-de-vire*, became popular throughout France]: lively song, sung in couplets, with a refrain; a theatrical piece intermingled with light or satirical songs; also spelled VAUDEVIL, n.

VAUDOIS, n. *vō-dwâ':* an inhabitant or the inhabitants of the Swiss canton of Vaud (q.v.); dialect spoken in the canton Vaud: ADJ. of or belonging to the canton Vaud, its people or their dialect: Waldensian. See also WALDENSES.

VAUDREUIL, LOUIS PHILIPPE DE RIGAUD, *lô-ē fē-lēp dė rē-gō vō-drė-y*, or *vō-drėl-y:* French naval officer: b. Rochefort 1724, Oct. 28; d. Paris 1802, Dec. 14. As a lieutenant he fought brilliantly against the English in an unequal combat in the Bay of Audierne 1759, May 19. In 1777 he was made vice-admiral, in 1779 aided in the siege of Savannah, in 1780 commanded a division at the

French victory over the British in the Channel of Dominica (April 17; May 15-19), and in that year was made governor of Santo Domingo. This post he soon resigned, and he participated in the action between de Grasse and Graves at the mouth of Chesapeake Bay 1781, Sep. 5-10), and in the siege of Yorktown. In 1782, April 12, he assisted in the battle with Rodney in the Saintes Islands channel, in August was promoted lieutenant-general, in 1789 was sent to the states-general, in 1791 emigrated to Great Britain, but during the consulate returned to France. Consult: Hennequin, *Biographie Maritime* (1835-7).

VAUDREUIL CAVAGNAL, *kâ-vân-yâl*, PIERRE FRANÇOIS DE RIGAUD, *pē-ār frân-swâ dė rē-gō*, MARQUIS DE: French naval officer, governor of New France: b. Quebec 1698, Nov. 22; d. Paris 1765, Oct. 20. He became major in the marine corps, was made governor of Three Rivers in 1733, and of Louisiana in 1742. In 1755 he was appointed governor-general of Canada. Parkman gives a very unfavorable picture of Vaudreuil and his administration. He did all that he could to hamper Montcalm, and thus hasten the downfall of French power. His capitulation at Montreal was disapproved by the French authorities, and he was imprisoned and tried, but acquitted. Consult: Parkman, *Montcalm and Wolfe* (1884; new ed. 1898).

VAUGHAN, *vaw'an*, nearly *vawn*, BENJAMIN, LL.D.: political economist: 1751, Apr. 19—1835, Dec. 8; b. Jamaica, West Indies; son of Samuel Vaughan, London merchant, whose wife was a native of Boston, Mass. Vaughan was educated at Cambridge University, England; graduated in medicine at Edinburgh 1781; soon afterward became a merchant in London. He was the intimate friend of Benjamin Franklin, and conducted an active correspondence with him and other philosophers and publicists of the time—e.g., Jeremy Bentham, Sir Samuel Romilly, Grey, Wilberforce. He edited the first collection of Franklin's fugitive writings. Vaughan wrote much himself on economic questions, but anonymously. He settled in Hallowell, Me., about 1800; and there passed the remainder of his life, practicing his profession among the poor, and giving medical counsel and medicines to his patients gratis. A large part of his fine library he gave to Bowdoin College.

VAUGHAN, CHARLES JOHN: English Anglican clergyman: b. Leicester 1816; d. Llandaff, Wales, 1897, Oct. 15. He was educated under Arnold at Rugby, and at Trinity College, Cambridge, took holy orders in 1841, and was successively vicar of St. Martin's, Leicester (1841-4), head-master of Harrow (1844-59), vicar of Doncaster (1860-9), master of the temple (1869-94), and dean of Llandaff from 1879. While at Harrow he did much toward increasing the efficiency of that school, and as master of the Temple became known for pulpit elo-

building, Strong hall, Raymond house, Edward Lathrop hall, and Eliza Davison house (four dormitories), Rockefeller hall (containing the recitation rooms and two auditorium halls), Vassar Brothers Laboratory (chemistry and physics), the New England building (biology, geology, and physiology), the museum (art gallery and music rooms), the observatory, the infirmary, and the Alumnæ gymnasium. A certain amount of gymnasium work is required of all students, and outdoor sports are encouraged; an annual field-day is held. The chapel, gift of Mrs. Mary Thaw Thompson (1877) and Mrs. Mary Morris Pratt (1880), was completed in 1904, June, and accommodates an audience of 1,300. A splendid new library building was dedicated in 1905, gift of Mrs. Frederick Ferris Thompson as a memorial to her husband, who was a trustee of the college and one of its chief benefactors. The library contains over 50,000 volumes; the students number about 1,000, and there are 90 in the faculty.

VAST, a. *vâst* [F. *vaste*, vast—from L. *vastus*, desolate, immense: It. *vasto:* see also *waste*, from the same root]: of great extent; very great in bulk, amount, numbers, force, or importance; very spacious; immense; in *OE.*, void; waste: N. that which is immeasurable; space. VAST'LY, ad. *-lĭ*. VAST-NESS, n. *-nĕs*, immense bulk or extent; immensity; greatness. VAST'Y, a. immense; mighty; enormously great. VASTIDITY, n. *văs-tĭd'ĭ-tĭ*, in *OE.*, immensity.—SYN. of 'vast'; huge; enormous; prodigious; mighty.

VASUDE'VA AND VASUDE'VA. See VISHN'U.

VAT, n. *văt* [AS. *fæt;* Dut. *vat;* Dan. *fad;* Icel. *fat;* Ger. *fass*, a tub, a vessel for holding liquids]: a large vessel or cask for holding liquids, particularly fermented liquors, in an immature state; a large vessel or cistern for steeping hides in: V. to put or pour into a vat. VAT'TING, imp. VAT'TED, pp.

VATE'RIA: genus of plants to which the tallow-tree belongs. See TALLOW-TREE.

VATIC, a. *văt'ĭk* [L. *vatēs*, a bard or prophet]: affected by supernatural influence; prophetic.

VATICAN, n. *văt'ĭ-kăn* [L. *mons vatĭcānus*, the Vatican Hill, in Rome, on the western bank of the Tiber]: the assemblage of buildings, adjoining the Church of St. Peter in Rome, which forms the pope's palace; hence, the papal authority or government. VATICANISM, n. *văt'ĭ-kăn-ĭzm*, the papal system of rule and religious obligations; the theological and ecclesiastical system based on the doctrine of papal infallibility and absolute papal supremacy; ultramontanism. VAT'ICANIST, n. *-ĭst*, an ultramontanist. THUNDERS OF THE VATICAN, the anathemas or denunciations of the pope.

VAT'ICAN, COUNCIL OF THE: assembly of the bishops of the Rom. Cath. Chh., in the Vatican Palace, Rome, 1869, Dec. 8. The papal bull of Pius IX. convoking the

Vatican Council was issued 1869, June 29; but the previous Sep. the pope had invited to attend 'all bps. of the churches of oriental rite not in communion with the apostolic see,' and all 'Protestants and non-Catholics;' but neither the separated orientals nor the Protestants were to have any voice whatever in the council; and in a letter to Card. Manning the pope wrote that the Protestants were invited to attend only that they might be referred to 'experienced men' for solution of their difficulties. Naturally, no bp. of any separate oriental chh. nor any Protestant responded to the invitation. Pius IX. had for many years meditated the calling of the council, and had sounded his bps. throughout the world to learn how they were disposed toward the convocation of a general council. Early in 1865 preliminary work toward preparing the subject-matters of the council was begun, and a 'congregation of direction' was named from the College of Cardinals; theologians were chosen from different countries as consulters to the preliminary congregations: all this in the strictest confidence. All the bps. of the chh. were formally invited 1867, June 4, to be present in Rome at the centenary of the martyrdom of Peter and Paul: those who attended were asked to give suggestions on sundry points of discipline and other matters later to come before the council. In addition to the 'congregation of general direction,' 6 special congregations were instituted 1869, June—viz., for 'ceremonial,' 'church and state,' 'oriental churches,' 'religious orders,' 'dogmatic theology,' 'discipline:' the members were ecclesiastics from all parts of the world, with cardinals as chairmen. That the question of papal infallibility was to come before the council, there was no authoritative announcement, public or private, till the council met; but 1869, Feb. 6, in the semi-official *Civiltà Cattolica*, a correspondent declared that the council would declare the pope infallible. The German bps., in council at Fulda 1869, Sept., took alarm at this announcement, and expressed their fears of consequences should papal infallibility be made an article of faith. The 'order of business' of the council was promulgated 1869, Nov. 27; commissions were at the same time named to discuss suggestions offered by bps.; drafts (*schemata*) were prepared of the decrees proposed to be adopted by the council. When the council opened, 719 members were present; the largest number present at any session was 764, all bps., abps., patriarchs, etc., except 52 who were abbots, generals of orders, etc. But of the bps. 120 were of titles *in partibus infidelium*. There was in the council some discussion of matters of discipline, but that had no definitive outcome. The real occupation of the council was with matters—or rather with a matter—of dogma; the whole completed result is found in the two 'constitutions,' as they are called—one, *De Fide Catholica*, an exposition of points of faith that no one in the chh., whether in the council or out of it, ever questioned; the

other, *De Ecclesia Christi:* in this is embodied the definition of the pope's infallibility. The first constitution was adopted without delay and unanimously by 667 voices. The second was a subject of impassioned discussion till the very last day of the sittings. In 1870, Jan., 45 German and Austrian bps., 32 French, 3 Portuguese, 4 oriental, 7 Italian, 27 Anglic (i.e., from English-speaking countries), begged the pope to have the dogma withdrawn; the protest was strongly supported from outside by the govts. of France, Austria, Bavaria, Portugal, Prussia; and many very distinguished members of the council—e.g., Manning (Westminster), Spalding (Baltimore), Strossmayer of Slavonia, Rauscher (Vienna), Darboy (Paris), Dupanloup (Orleans), Kenrick (St. Louis), besides signing the petition, took an active part in organizing the opposition. When the constitution as it stands was read in council (July 13), 451 members voted *placet* (i.e., yea), 62 *placet juxta modum* (yea, provided certain changes were made in phraseology); 88 *non placet* (i.e., nay); 70 abstained from voting. July 18 the constitution came up for a final vote, and there were 535 yeas, a gain of 84 on the vote of 5 days before; this gain, no doubt, came mainly from the middle faction, who had then voted *placet secundum modum*, and in part from the absent or non-voting 70. The opposition (*non-placet* faction) was nowhere visible at the close of the battle. Of the 88 who formed its voting strength July 13, only 2 stood in their place July 18. These were Edward Fitzgerald, Bp. of Little Rock, Ark. (b. Limerick, Ireland, 1834), and Riccio, Bp. of Ajaccio. The council was prorogued Sep. 20.

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VATTEL, *vât-tĕl',* EMERICH DE: writer on international law: 1714, Aug. 25—1767, Dec. 20; b. Convet, in Neufchâtel; son of a Prot. clergyman who had been ennobled by the king of Prussia, whose subject he was. Vattel studied for the ministry at Bâle and Geneva, but he gave more attention to the writings of Leibnitz and

Wolf than to those of the Calvinistic divines; and instead of becoming a country clergyman, he resolved to push his fortune at the court of Berlin, as a man of letters and diplomatist. In 1744 he received an appointment at Dresden from the Elector of Saxony, then also king of Poland; and 1746 he was sent by him as minister to Bern. In this post he had ample leisure for literary pursuits. He published, in French, under different titles, collections of essays on miscellaneous subjects; but his chief attention for ten years was bestowed on his great work, the *Droit des Gens; ou Principes de la Loi Naturelle appliques à la Conduite et aux Affaires des Nations et des Souverains.* This work contained little that was new, but it abridged and systematized the doctrines of Grotius, Puffendorf, and Wolf. Vattel had that skill in arranging his materials, and that power of lucid expression, which so often characterize French men of letters; and his book became rapidly popular as a text-book of international law. Like all his predecessors in the same field, Vattel based his whole system on an imaginary law of nature, and it would be easy to enumerate a large number of false conclusions to which he came in the absence of the light thrown on the law of nations by practice, and by the principle of utility in our time, so generally adopted as the test of international morality. After the completion of his great work, Vattel was recalled to Dresden, where he married, 1764, and was promoted to the rank of privy councilor. An English translation of Vattel, with notes, was republished by Chitty 1833.

VAUBAN, *vō-bŏng'*, Sebastien le Prestre de, Marshal of France; renowned military engineer: 1633, May 15—1707, Mar. 30; b. at Saint Leger de Fougeret, department of Nièvre. He was left an almost destitute orphan at the age of ten, and his education was under the auspices of the *curé* of his village. Leaving Saint Leger 1651, he set out on foot to join Condé's army on the Belgian frontier. Taken prisoner 1653, he joined the royalists, and during the succeeding contest was attached mostly to the army of Turenne, in which his engineering work gained him high repute. In 1667 he appeared again in the north, capturing one after another the strong defenses of the Belgian frontier. About this period, Vauban's probity and punctuality, no less than his genius, charmed the powerful Louvois, who appointed him to the honorable work of fortifying the Flemish strongholds which had fallen into the possession of France. In the war with Holland, Vauban took his old place as director of siege operations, and introduced into practice in w. Europe the method of approach by parallels (recently borrowed from the Turks), at the siege of Maestricht (1673); and with such effect that that strong fortress capitulated in 13 days. In 1676 he conducted the remarkable sieges of Valenciennes and Cambrai;

stormed the latter in open day, against the unanimous opinion of the generals of the army; and two years later was rewarded for his long and glorious services by the appointment of director-general of fortifications, with supreme control of the department of military engineering. Vauban surrounded France with a cordon of fortresses; he also captured the almost impregnable fortress of Luxembourg, and planned the magnificent aqueduct of Maintenon, conveying the waters of the Eure to Versailles.

In the war which broke out 1688, Vauban conducted the sieges of Philipsburg, Mannheim, and Frankenthal (introducing, at the last, his invention of ricochet firing), Mons (1691), and Namur (1692), with his usual success. After this period, Vauban produced few professional works of importance. After the peace of Ryswick 1697, he applied his practical mind to the various deficiencies and anomalies in the internal government of France; and one of his works, *Dîme Royale* (1707), excited an immense sensation by his discussion of taxation, in which he anticipated the doctrines, which a century later, overthrew the French monarchy. Vauban lost favor with the king, and his book was seized and confiscated. He died at Paris.—Fontenelle calculates that Vauban had constructed 33 new fortresses, repaired 300 old ones, conducted 53 sieges, and had been present at 140 'actions of vigor'; and in his practice the capture of a fortress was certainly a mere question of time and powder.—See his professional works, *Œuvres Militaires* (Paris 1796). See *Nouvelle Biographie Générale.*

VAUCLUSE, *vō-klüz':* department in s.e. France, bounded w. by the Rhone, s. by the Durance, which separates it from the department of Bouches-du-Rhone; 1,273 sq.m. The Rhone is the great river, and its affluents, except the Durance, are small. The department is traversed in the e. by spurs of the Alps. The plains are in the w.—the chief being those of Orange, Carpentras, and Cavaillon. In the e., the mountains are separated by narrow, torrent-plowed valleys; and the summits, the chief of which is Mont Ventoux, 6,273 ft. high, are arid and bare. The climate is healthful and temperate, though subject to great variations—the winds from the n. and n.e. being sometimes violent. Vaucluse, though more agricultural than manufacturing, does not produce cereals largely; but the peach, pear, prune, almond, and fig trees thrive; and olive, mulberry, and orange trees abound. Wines and honey of fine quality are produced. There are four arrondissements—Avignon, Apt, Carpentras, and Orange. Avignon is the capital. Population of department (1901) 236,949.

VAUD, *vō* (Ger. *Waadt*): canton in w. Switzerland, between the Jura and the Bernese Alps; 1,244 sq.m. Vaud is the third in population among Swiss cantons. It is comparatively level, but is traversed by an elevated

tract, known as Mt. Jorat, from which plains slope to the Lake of Geneva on the s., and the Lake of Neufchâtel on the n. On both sides, near the mountains, are extensive pasture-lands, but the greater part of the country is highly cultivated. The orchards and vineyards are very extensive, the latter yielding excellent white wines. There are no manufactures of importance. Vaud is traversed by railways, which connect it in two directions with France, and in three, with the rest of Switzerland. It forms part of French Switzerland, the dialect spoken being the Vaudois. The religion is Protestant. Since 1830 Vaud has been a democratic republic, the council of the canton being elected and controlled by the people. After the fall of the Roman empire, Vaud formed part of the Burgundian kingdom. In the 13th century it became a dependency of Savoy, to which it was annexed 1359. In 1476 the House of Savoy took part with the Duke of Burgundy in his struggle with the Swiss; and on his defeat a part of Vaud was annexed to the adjoining cantons. In 1536 the Bernese took possession of the whole of Vaud, which they divided into 15 parts, administered by *baillis,* appointed at Bern. The nobility became patricians of Bern, and thus acquired great influence. Still, the local councils had the power of appointing magistrates and administrative officers, which tempered the aristocratic character of the government. The French invasion put an end to the rule of Bern, and Vaud became a separate canton. The government remained in the hands of the higher classes until 1830, June, when a new constitution, granting a vote to every adult *bourgeois* of good character, was obtained from the council. The existing democratic-representative constitution dates from 1845, but was revised 1861. The Vaudois are industrious and well educated. Capital, Lausanne. Population of Vaud (1900) 281,379.

VAUDEVILLE, n. *vōd'vĭl* [F.—a corruption of the name *Vaux-de-Vire,* in Normandy, where lived about the middle of the 15th century Olivier Basselin, a satirical poet, whose drinking-songs, known as *Les Vaux-de-vire,* became popular throughout France]: lively song, sung in couplets, with a refrain; a theatrical piece intermingled with light or satirical songs; also spelled VAUDEVIL, n.

VAUDOIS, n. *vō-dwâ':* an inhabitant or the inhabitants of the Swiss canton of Vaud (q.v.); dialect spoken in the canton Vaud: ADJ. of or belonging to the canton Vaud, its people or their dialect: Waldensian. See also WALDENSES.

VAUDREUIL, LOUIS PHILIPPE DE RIGAUD, *lô-ē fē-lēp dė rē-gō vō-drė-y,* or *vō-drél-y:* French naval officer: b. Rochefort 1724, Oct. 28; d. Paris 1802, Dec. 14. As a lieutenant he fought brilliantly against the English in an unequal combat in the Bay of Audierne 1759, May 19. In 1777 he was made vice-admiral, in 1779 aided in the siege of Savannah, in 1780 commanded a division at the

French victory over the British in the Channel of Dominica (April 17; May 15-19), and in that year was made governor of Santo Domingo. This post he soon resigned, and he participated in the action between de Grasse and Graves at the mouth of Chesapeake Bay 1781, Sep. 5-10), and in the siege of Yorktown. In 1782, April 12, he assisted in the battle with Rodney in the Saintes Islands channel, in August was promoted lieutenant-general, in 1789 was sent to the states-general, in 1791 emigrated to Great Britain, but during the consulate returned to France. Consult: Hennequin, *Biographie Maritime* (1835-7).

VAUDREUIL CAVAGNAL, *kâ-vân-yâl*, PIERRE FRANÇOIS DE RIGAUD, *pē-ār frân-swâ dė rē-gō*, MARQUIS DE: French naval officer, governor of New France: b. Quebec 1698, Nov. 22; d. Paris 1765, Oct. 20. He became major in the marine corps, was made governor of Three Rivers in 1733, and of Louisiana in 1742. In 1755 he was appointed governor-general of Canada. Parkman gives a very unfavorable picture of Vaudreuil and his administration. He did all that he could to hamper Montcalm, and thus hasten the downfall of French power. His capitulation at Montreal was disapproved by the French authorities, and he was imprisoned and tried, but acquitted. Consult: Parkman, *Montcalm and Wolfe* (1884; new ed. 1898).

VAUGHAN, *vaw'an*, nearly *vawn*, BENJAMIN, LL.D.: political economist: 1751, Apr. 19—1835, Dec. 8; b. Jamaica, West Indies; son of Samuel Vaughan, London merchant, whose wife was a native of Boston, Mass. Vaughan was educated at Cambridge University, England; graduated in medicine at Edinburgh 1781; soon afterward became a merchant in London. He was the intimate friend of Benjamin Franklin, and conducted an active correspondence with him and other philosophers and publicists of the time—e.g., Jeremy Bentham, Sir Samuel Romilly, Grey, Wilberforce. He edited the first collection of Franklin's fugitive writings. Vaughan wrote much himself on economic questions, but anonymously. He settled in Hallowell, Me., about 1800; and there passed the remainder of his life, practicing his profession among the poor, and giving medical counsel and medicines to his patients gratis. A large part of his fine library he gave to Bowdoin College.

VAUGHAN, CHARLES JOHN: English Anglican clergyman: b. Leicester 1816; d. Llandaff, Wales, 1897, Oct. 15. He was educated under Arnold at Rugby, and at Trinity College, Cambridge, took holy orders in 1841, and was successively vicar of St. Martin's, Leicester (1841-4), head-master of Harrow (1844-59), vicar of Doncaster (1860-9), master of the temple (1869-94), and dean of Llandaff from 1879. While at Harrow he did much toward increasing the efficiency of that school, and as master of the Temple became known for pulpit elo-

quence, and was conspicuous as one of the leaders of the broad church party. He married a sister of Dean A. P. Stanley. Among his 40 or more published volumes are: *Harrow; Temple;* and *University Sermons; Commentaries on Acts, Revelations, Philippians; Family Prayers; Discourses on Liturgy and Worship; Addresses to Young Clergymen; The School of Life.*

VAUGHAN, George Tully: American surgeon: b. Arrington, Nelson county, Va., 1859, June 27. He was educated at the Kenmore University High School, Amherst, Va. (1867-8); he then graduated with the degree of M.D. from the University of Virginia, and from Bellevue Medical College, New York, after which he took post-graduate courses in the New York Polyclinic, the University of Berlin, Germany, and the Jefferson Medical College, Philadelphia. He was appointed assistant surgeon in the United States Marine Hospital Service in 1888; surgeon in 1900, and assistant surgeon-general in 1902. During the war with Spain he served as major and brigade surgeon of the seventh army corps. Since 1897 he has been professor of surgery in Georgetown University, Washington; surgeon to Georgetown University, Emergency, and St. Elizabeth hospitals; and from 1902 has been assistant surgeon of the United States Public Health and Marine Hospital Service. He has written *Principles and Practice of Surgery* (1903).

VAUGHAN, Henry: Welsh poet: b. Newton, parish of Llansaintfraed, Brecknockshire, 1622, Apr. 22; d. there 1695, Apr. 23. By contemporaries he was styled 'The Silurist,' because his native region was among the Silures, or folk of South Wales. He was educated at Jesus College, Oxford; and after studying the law for a time in London, abandoned it for medicine, and practiced with much success and reputation first at Brecknock and later at Newton. It appears that he was imprisoned for his loyalty at the revolution, and that he was present at the battle of Rowton Heath—it may be as surgeon with the royalist army. His first volume was *Poems, with the Tenth Satyre of Juvenal Englished*—a free rendering (1646). This he followed by *Olor Iscanus—Swan of the Usk* (1651), the chief portion of the volume being a eulogy of that river. Thereafter his verse took on a predominantly religious and devotional cast and greatly improved in poetical quality. In 1650 appeared the first part of *Silex Scintillians* (Sparks from the Flint), described in its sub-title as made up of 'sacred poems and private ejaculations,' and completed in 1655 by the addition of a second part containing what are probably his best known stanzas—'They are all gone into the world of light.' One 'J. W.' collected (1678) various elegies, translations, and other productions as *Thalia Rediviva;* and Vaughan also published some books of prose, among them *The Mount of Olives* (1652), a work of devotion. Garnett thinks Vaughan less frequently than Herbert dis-

plays the curious absurdities and attempts at wit so much affected in the verse of the time. He abounds in occasionally felicitous phrases and lines—like, as he said, 'unanticipated sparks from a flinty ground.' A few of his poems have been given by critics a very high place in literature. He was practically unknown until H. F. Lyte edited the sacred poems only in 1847. A complete edition of his works is that of Grosart (1871); of the poems, that of Chambers (1896).

VAUGHAN, Herbert: English Roman Catholic prelate: b. Gloucester 1832, Apr. 15; d. London 1903, June 20. He was educated at Stonyhurst College, and on the continent; was ordained to the priesthood in 1854; founded St. Joseph's College for foreign missions at Mill Hill, Hendon; visited Maryland as a missionary to the negroes; and in 1872 was consecrated bishop of Salford. On Manning's death he was appointed (1892) archbishop of Westminster, and shortly afterward was made cardinal. He was a preacher of much eloquence, and proprietor of the *Dublin Review* and the *Tablet*. He displayed a marked interest in the temperance cause and in commercial education among Roman Catholics, building for this latter purpose St. Bede's College.

VAUGHAN, Robert: English clergyman and historian: b. 1795; d. Torquay 1868, June 15. He was professor of history in London University; and in 1842 became president of the Lancashire Independence College at Manchester, remaining in that position until 1857. He also founded the *British Quarterly Review*, and for 20 years was its editor. Among the more important of his works are: *Life of John de Wycliffe* (1828); *The Protectorate of Cromwell* (1838); *History of England Under the House of Stuart* (1845); *The Age of Great Cities* (1842); *Revolutions in English History* (1859-60).

VAUGHAN, Thomas Wayland: American geologist: b. Jonesville, Tex., 1870, Sep. 20. After graduating from Tulane University in 1889, and from Harvard University in 1893, he went to Europe, studying in the museums there. He then engaged in geological and palæontological researches, making a specialty of tertiary geology, fossils, and recent corals, and now is connected with the United States Geological Survey. He has published *The Eocene and Lower Oligocene Coral Faunas of the United States*, Vol. VI., Monograph XXXIX., United States Geological Survey, besides many papers on geology and palæontology.

VAUGHAN, Victor Clarence: American physician and educator: b. Mount Airy, Mo., 1851, Oct. 27. He was graduated from Mount Pleasant College in 1872, became instructor in the University of Michigan 1876 and professor in 1880, and dean in 1890. He served in the Santiago campaign as major and surgeon; was brevetted lieutenant-colonel, and appointed surgeon-general of Spanish war veterans. He has published: *Osteology and*

Myology of the Domestic Fowl (1876); *Text-book of Psychological Chemistry; Ptomaines and Leucomaines* (with Dr. Novy); etc.

VAUGHAN, Sir William: English poet and colonial planter: b. Golden Grove, Carmathenshire, 1577; d. Torcoed, England, 1641, Aug. He was educated at Oxford, graduated in law, and in 1625 became a physician. He founded the settlement named Cambriol at Newfoundland, concerning which he wrote *The Golden Fleece, Divided Into Three Parts, etc., by Orpheus Junior* (1626), a quaintly written combination of prose and verse notable as the first volume of poetry written in the North American colonies. He returned to England in 1625. He was also author of *Cambrensium Caroleia* (1625).

VAULT, v. *vawlt* [F. *volte,* a round, a turn: It. *volta,* a turn, a tumble: from same root as Vault 2]: to bound or curvet as a horse; to turn or make a turn; to leap or leap over with the help of a pole or of something to lay the hands on; to bound: N. the bounding turn which skilful riders teach their horses; a leap; a tumbler's gamboi or turn. Vault'ing, imp. Vault'ed, pp. Vault'er, n. *-ẽr,* one who vaults or leaps; a tumbler.

VAULT, n. *vawlt* [OF. *voultc, voute,* a vault, cavern—from L. *volūtus,* pp. of *volvĕrĕ,* to roll or turn about: F. *voûte;* It. *volta,* a vault, an arched roof]: an arched roof of stone or brick-work; cellar or underground building having an arched roof; cave or cavern; underground repository or closely constructed building for the dead; arch-like expanse, as the *vault* of heaven: V. to shape as a vault; to arch. Vault'ed, a. having a concave overhead; covered with vaults or arches. Vaulty, a. *vawlt'ĭ,* in *OE.,* arched; concave. Vault'age, n. *-āj,* in *OE.,* a vaulted room. Vault'ing, n. *-ĭng,* a range of vaults.—*Vaults* are of various kinds. The simplest is the plain wagon or tunnel vault, being a simple segmental or semicircular arch, thrown across a longitudinal apartment, and extending from one end to the other; ordinary bridges are an example of this style of vaulting. Such vaults were commonly used by the Romans, who built also vaults with *groins*—i.e., vaults intersecting one another: see Groin. A pointed variety of the tunnel arch was used by the Assyrians for vaulting their large drains. The Egyptians are said to have been acquainted with vaulting; but the earliest remains of ancient vaults of any magnitude are Roman works.

The Roman vaults, where groined, are usually constructed with carefully cut stone, to prevent the angle from chipping. Mediæval architects formed the groins only of dressed stone, and the filling in of the vault with commoner materials. This led to the groin becoming a prominent feature in mediæval architecture, being generally ornamented with moldings and carved work. Dome-shaped or hemispherical vaults also were much used by the Romans. The Pantheon in Rome is the finest extant

example, being a circular building with a dome 142 ft. in diameter. Roman domes and vaults are frequently ornamented with sunk panels. During the Renaissance period, vaulting in great measure gave place to wooden roofs; but when employed, the domical or plain groined vaults of Roman architecture are chiefly used. See GOTHIC ARCHITECTURE; FAN-TRACERY VAULTING; RIB; etc.

VAULT'ING SHAFT: small column or pillar supporting the ribs of a Gothic vault. These shafts generally occur in clusters, and may either spring from the ground, or be supported on small corbels in the wall.

VAUNT, v. *vânt* [F. *vanter;* It. *vantare*, to vaunt, to brag—from mid. L. *vanitārĕ*, to boast—from L. *vānus*, vain, empty]: to make a vain display of; to boast; to play the braggart: N. a boast; a brag; a vain display. VAUNT'ING, imp.: N. conceited or vainglorious boasting. VAUNT'ED, pp. VAUNT'ER, n. *-ẽr*, a boaster; a braggart. VAUNT'INGLY, ad. *-lĭ*.

VAUNT, n. *vânt* [F. *avant*, before]: in *OE.*, the van; that which precedes; the beginning or first part. VAUNT COURIER, in *OE.*, a van-courier; a forerunner; a precursor.

VAUQUELIN, *vō-klăng'*, JEAN: French poet: 1535-1607; b. at the château of La Fresnaye, near Falaise; of noble family. He made a pretense of studying law at Poitiers, at Paris, and at Bourges, but really spent his time in gayety and verse-making. He finally became president of the *Présidcal* bench at Caen, where he died. His *Œuvres Poétiques* contain many sportive songs and other light pieces. He was the first writer of idyls in French verse, and is considered the founder of French satire, which he redeemed from its previous grossness.

VAUQUELINITE, n. *vawk'lĭ-nīt* [after *Vauquelin*, a French analytic chemist (1763-1829)]: a chromate of lead and copper, occurring in veins with other ores, of a dark olive-green color and resinous lustre.

VAUTIER, BENJAMIN: Swiss painter: b. Morges, on the Lake of Geneva, 1829; d. 1898. He began his art training at Geneva and for some years earned his living as an enameler of metal ornaments. In 1850 he joined the classes of R. Jordan at Düsseldorf, and began his study of peasant life in the highlands of Bern. In 1856 he went to Paris, and on his return to Düsseldorf produced the first of his Bernese pictures, *The Interior of a Swiss Village Church, with Worshipers.* From that time he gradually gained the reputation of one of the first Swiss genre painters by the series of pictures in which he portrayed scenes from peasant life not only in Switzerland but in Swabia and Bavaria. His works are all distinguished by faultless drawing, robust individuality; vividness in the delineation of local and national types, and they are, moreover, as is natural to the subjects treated of, brimful of delightful humor. As a colorist Vautier is master of harmony, and his composition is

graceful and dramatic. Among the finest and most popular of his works may be mentioned: *Card-playing Peasants Surprised by Their Wives; Sunday Afternoon in Swabia; Toasting the Bride; Country Funeral; Black Peter;* etc. He was also successful as an illustrator of books, and his designs for Immerman's *Oberhof;* Auerbach's *Barfüssele,* and for *Hermann und Dorothea* are very fine and have been much admired.

VAUVENARGUES, Luc de Clapier, Marquis de: French moral philosopher: b. Aix, Provence, 1715, Aug. 6; d. Paris 1747, May 28. He entered the army in 1733, but resigned with broken health at 27. As a philosopher he inclines to the Stoic school, and his work was warmly praised by Voltaire, of whom he was a friend; but popular appreciation of his writings came only after his death. He wrote *Introduction to a Knowledge of the Human Mind* (1746), followed by *Reflections and Maxims.*

VAUX, Calvert: American landscape architect: b. London 1824, Dec. 20; d. Bensonhurst, L. I., 1895, Nov. 19. He was educated in London, and in 1848 came to the United States as the assistant of A. J. Downing, the celebrated American landscape-designer, whose partner he became in 1851. He assisted in laying out the grounds surrounding the capitol and Smithsonian Institution at Washington, and in partnership with F. L. Olmsted he laid out Central Park in New York. In 1865 his design for Prospect Park, Brooklyn, was accepted and he was subsequently engaged with Mr. Olmsted in laying out parks in Chicago, Buffalo, the state reservation at Niagara Falls, and at other cities and towns throughout the United States. They laid out Riverside and Morningside parks in New York, Vaux becoming landscape architect of the public parks in 1881. He designed the Museum of Natural History (1873) and the Metropolitan Museum of Art (1874) in New York, besides other public buildings. To him is due credit for the artistic and original treatment of the transverse roads in Central Park. He wrote: *Villas and Cottages* (1857).

VAUX, Richard: American lawyer: b. Philadelphia, Pa., 1816, Dec. 19; d. there 1895, Mar. 22. He was admitted to the bar in 1836, soon after was sent as bearer of dispatches to the United States minister in London, and on his arrival there was appointed secretary of the legation. In the following year he went to Brussels to assist in reorganizing the United States embassy there, and later returned to London, where he was appointed private secretary to the United States minister, Andrew Stevenson. He returned to the United States in 1839, was recorder of deeds at Philadelphia in 1842-9. In 1843 he was appointed inspector of the state prison and was also elected comptroller of the public schools, thus occupying three important public offices at the same time. He was elected mayor of Philadelphia in 1855, became

president of the board of directors of Girard College in 1859, was largely instrumental in securing, in 1885, the present charter of Philadelphia, and in 1890 was elected to congress. He published: *Recorder's Decisions* (1845); and *Reports of the Penitentiary* (45 vols. 1842 *et seq.*).

VAUX, THOMAS, Lord: English poet: b. Harrowden, England, 1510; d. 1556, Oct. He was educated at Cambridge, succeeded to the barony at 13, and accompanied Cardinal Wolsey on his embassy to France in 1527. In 1530 he took his seat in the house of lords, attended Henry VIII. to Calais and Boulogne in 1532, and in 1533 was created Knight of the Bath and appointed captain of the island of Jersey, an office he resigned in 1536. He occupied his seat in the house of lords until 1555. Such of his verse as survives consists in the main of lyrics, which were much admired in their day. In *The Paradyse of Daynty Devises* appear several of his poems, the best of which, *The Aged Lover Renounceth Love* and *The Assault of Cupid*, were previously published in Tottin's *Miscellany* (1557).

VAUXHALL GARDENS: in London, formerly a fashionable place of entertainment and summer resort situated near the Thames, in the parish of Lambeth, about 1½ m. from Westminster bridge. They are now removed and built over.

VAUXHALL' NEC'TAR: mixture of rum and syrup, with an addition of benzoic acid, or flowers of Benjamin.

VAVASOR, n. *văv'a-sŏr*, or VAV'ASOUR, n. *-sôr* [OF. *vavassour;* mid. L. *vavassor*, a vavasor; *vassus*, a retainer (see VASSAL)]: under the *feudal system*, one who, himself holding of a superior or lord, had others holding under him; one who held his lands from one of the higher nobility, and not directly from the crown. In this class were comprehended the *châtelains*, who owned castles or fortified houses, and possessed rights of territorial justice. VAV'ASORY, n. *-sŏr-ĭ*, the lands of a vavasor.

VAWARD, n. *vā'wawrd* [corrupted from *vanward* = *vanguard*]: in *OE.*, the advanced-guard of an army; the vanguard; the first of anything.

VAW'TER, CHARLES ERASTUS: American educator: b. Monroe co., W. Va., 1841, June 9; d. 1905, Oct. 27. He served in the Confederate army in 1861-5, obtaining a captaincy in the 'Stonewall' brigade; was graduated from Emory and Henry College (Emory, Va.) in 1866; studied also at the University of Virginia (Charlottesville); and was professor of mathematics at Emory and Henry from 1868 to 1878. In 1878 he became superintendent of the Miller Manual Labor School at Albemarle, Va. He was considered an authority on manual training in the southern states.

VAYGACH, *vī-gâch'* (also *Vaigatch*, *Vaigatz*, and *Waigatz*): island of the Arctic ocean, belonging to Russia; between the mainland and the island of Nova Zembla.

The strait which separates Vaygach from the mainland is about 5 m. wide. There is no resident population; but, being productive in furs and fish, it annually attracts Russian and Samoyede hunters.

VÂYU, *vâ'yô* [from Skr. *vâ,* blow]: in the Vedic mythology of the Hindus, the wind, or the god of the wind. According to Yâska, ancient commentators of the Vedas hold that there are only three great deities—viz., *Agni,* fire, whose place is on earth; *Sûrya,* the sun, whose place is in heaven; and *Vâyu,* or *Indra,* whose place is in the intermediate sphere. In the epic and Purânic mythology, Vayu occupies an inferior position, and the legends there related of him have no cosmical character. They give him a wife, *Anjanâ,* by whom he has a son, the monkey *Hanumat.* When represented, Vayu either rides on an antelope, with a sabre in his hand, or he is seated, holding his son Hanumat in his arms. See Muir's *Contributions to a Knowledge of the Vedic Theogony and Mythology,* in *Journal of the Royal Asiatic Society* (1864).

VÂYU-PURÂN'A. See PURÂN'A.

VEADER, or VEADAR: an additional or supplementary month of the Jews, added sometimes after the third, sometimes after the second sacred year, care being taken that the seventh year should have no such month appended to Adar.

VEAL, n. *vēl* [OF. *veel;* F. *veau,* veal—from L. *vitellus,* a little calf; *vitŭlus,* a calf]: the flesh of a calf.

VEB'LEN, THORSTEIN B., PH.D.: American publicist. He was graduated from Carleton College, Minn., in 1880, studied later at Johns Hopkins and Yale, was instructor in political economy at the University of Chicago 1896-1900, and then assistant professor of the same there, and is now associate professor of economics at Leland Stanford Jr. University. He is editor of *The Journal of Political Economy,* and has published *The Theory of the Leisure Class* (1899); *The Theory of Business Enterprise* (1904).

VECCHI, *vĕk'ē,* AUGUSTUS VICTOR: Italian naval writer: b. Marseilles, France, 1843. He was educated in the Royal Naval School at Genoa, rose to be lieutenant in the naval service (1866), and resigned in 1872. He has published: *Saggi Storico-Marinareschi* (1877); *Leggende di Mare* (1879); *Nuove Leggende* (1880); *La Vita e le Geste del Generale G. Garibaldi* (1882); *Ironie Blande* (1889); *Bozzetti di Mare* (1897); *Memorie di un Luogotenente di Vascello* (1897); *L'Italia Marinare o il Lido della Patria* (1899).

VECTOR, n. *vĕk'tŏr* [L. *vector,* a bearer—from *vectus,* pp. of *vehĕrĕ,* to carry]: a line supposed to be drawn from a body moving round any centre to that centre; a straight line connecting any point, as of a curve, with a fixed point or pole round which it turns. See RADIUS VECTOR, under RADIUS, which is the common name.

VEDA, n. *vē'dá* [Skr. *veda*, knowledge—from *vid*, to know]: one of four collections of ancient writings in Sanskrit, forming the basis of the Brahmanical system of religious belief (see INDIA—*Religion*). VEDIC, a. *vē'dĭk*, of or pertaining to the Vedas and their literature.—The oldest *Veda*—and probably the oldest literary document existing—is the *R'igveda;* next earliest of Vedas is the *Yajurveda* and *Sâmaveda;* latest is the *Atharvaveda*. The first three also bear the collective title *trayî*, or 'the threefold' (sc., science); and all four are considered divinely inspired. Each of these Vedas consists of two distinct divisions—a *Sanhitâ*, or collection of *mantras* or hymns; and a portion called *Brâhman'a*. The mantras are prayers, praises, thanksgivings, meditations, lamentations, blessings, imprecations, etc. (See Müller, *Anc. Skr. Literature*, 343.) If a *mantra* is metrical, and intended for loud recitation, it is called *R'ich* (from *r'ich*, praise)—whence the name *R'igveda*—i.e., the Veda containing such praises: if it is in prose, and intended for inaudible muttering, it is called *Yajus* (from *yaj*, sacrifice): therefore *Yajurveda* signifies the Veda containing such *yajus:* if it is metrical, and intended for chanting, it is termed *Sâman;* whence *Sâmaveda* means the Veda containing such *sâmans.*—No special name is given to the mantras of the fourth Veda. The author of the mantra—the inspired 'seer'—is termed its *R'ishi* (q.v.); and the object in which the mantra is concerned is its *devatâ*—a word which generally signifies 'deity,' but whose meaning in connection with the mantras is various. *Brâhman'a* designates, according to *Mâdhava-Sâyan'a*, the great commentator on the Vedas, that portion in prose of the Vedas which contains either commandments or explanations, and sometimes mystical and philosophical speculations: the *Brâhman'a* portion of the Vedas is therefore the basis on which the Vedic ritual rests (see KALPA: VEDÂNGA), and whence the *Upanishads* (q.v.) and the philosophical doctrines (see SANSKRIT LITERATURE) took their development.

Though *Mantras* and *Brâhman'as*—both of which are termed also *S'ruti* (q.v.)—were held at a later period of Hinduism to have existed simultaneously—that is, from eternity—it is certain that the Brâhman'a portion of each Veda is posterior to at least some part of its Sanhitâ, for it refers to it; and so great a bulk of works as that represented by both portions must have been the gradual result of a considerable period of time, reflecting various conditions of society, various phases of religious belief, and different periods of language. The difficulty, however, critically to discern these periods, is enhanced by the losses which these writings suffered before they were preserved in the shape in which we now possess them. Both Mantras and Brâhman'as had to pass through a large number of S'âkhâs, or schools, and these schools were in animosity to one another—each S'âkhâ claiming to possess the only true and genuine Veda. These S'âkhâs were very numerous; though the R'igveda is now extant in only one, the Sâmaveda in perhaps two, etc. (See Müller's

Anc. Skr. Lit., 51.) The result was an endless variety in readings of the S'ruti, in arrangement of the writings, in additions and omissions of texts, and in *interpretation* of passages.

The character of the Sanhitâ or Mantra portion of the four Vedas—on which their Brâhman'a portion is based—as well as the relation in which these Sanhitâs stand to each other, is intelligible only if it is borne in mind that the ancient Hindu believed that he could secure the favors of his gods chiefly by sacrificial rites; that gradually these rites became complicated and manifold, and that special care, therefore, had to be taken to provide for a correct celebration of the sacrifices. The original worship seems to have been simple (see INDIA—*Religion*); but when sacrifices were instituted which lasted from one day to eleven, or even to a hundred days, or for several years, and when the Brahmanic caste found in such sacrifices the means of establishing its sway over the other castes, and of an easy livelihood, it was made a rule that no sacrifice could be performed without one *R'itwij*, or priest; and that a great sacrifice celebrated by wealthy people required the assistance of not less than 16 priests, besides menials, chanters, etc. It was requisite that the Brahman priest, most learned in the Vedas of all the priests, should supervise all details in the complicated and artificial ritual. (See Müller, *Anc. Skr. Lit.*, pp. 468, 469.)

The R'igveda being the earliest of the Vedas was therefore less developed in ritual form and for sacrificial use than were the later; hence a tendency arose to maintain the greater practical efficiency of one of the later Vedas over the avowedly oldest Veda. For though some hymns in the R'igveda bear testimony to the existence, at that early period, of ritual acts, it does not follow that the R'igveda, as such, was composed for recitation during their performance. A collection of songs, in short, which was the growth of time, and, to some extent, a natural expression of feeling, became inadequate for a regular liturgy of a highly developed ritual. Out of this necessity there arose the *Sâmaveda* and the *Yajurveda*. The Sâmaveda was entirely made up of extracts from the R'igveda, put together to suit the ritual of the so-called Soma sacrifices. The origin of the Yajurveda is similar; it, too, is chiefly composed of verses from the R'igveda, but with new mantras added to suit a widened sphere of ritual. Hence the orthodox Hindu regarded the Yajurveda with especial predilection, as practically best adapted to his use; while all the sacredness of the Sâmaveda and Yajurveda, and the belief in their inspired character, rest on the assumption that they are of the same origin as the R'igveda, which dates from eternity, and which was 'seen' by the R'ishis who uttered it. (See the article 'The Inspired Writings of Hinduism,' *Westminster Review*, 1864, Jan.)

All, therefore, that is left of the oldest Veda in the Sâmaveda and Yajurveda is a R'igveda piecemeal; its hymns scattered about; verses of the same hymn transposed; verses from different hymns combined, and even

the compositions of different poets brought into one and the same hymn, as if of the same authorship. Under such treatment the Yajurveda lost all poetical worth; and it is surprising that the Sâmaveda should have saved so much as it possesses. The *Atharvaveda*, too, is made up in a similar manner as the Yajurveda, except that the additions in it to the garbled extracts from the R'igveda are more considerable. It is avowedly the latest Veda; and its use seems to have been not 'for the sacrifice, but merely for appeasing evil influences, for insuring the success of sacrificial acts, for incantations, etc.;' but on this very ground, and perhaps on account of its pervading mysteriousness, it obtained, among certain schools, a degree of sanctity beyond the older Vedas.

From the general character of these four Vedas, we turn to glance at their special contents.

For the religious ideas expressed in the *R'igveda*, see INDIA—*Religion:* see also, besides the deities mentioned there, VARUN'A: VÂYU: YAMA: and J. Muir's *Contributions to a Knowledge of Vedic Theogony and Mythology*, in *Journal of the Royal Asiatic Society*, 1864. The social condition of the Hindus, as reflected from the hymns of the R'igveda, is not that of a pastoral or nomadic people, as is sometimes supposed, but indicates an advanced civilization. Frequent allusion is made in them to towns and cities, to mighty kings and their prodigious wealth. Besides agriculture, they mention various useful arts—e.g., weaving, melting precious metals, fabricating cars, golden and iron mail, and golden ornaments. The uses of the needle and of musical instruments are known to them. They prove that the Hindus of that period sometimes engaged in naval expeditions; and that they had some knowledge of medicine, and had made some advance in astronomical computation—mention being made of the adoption of an intercalary month, for adjusting the solar and lunar years. They were acquainted with the vices of civilization, for we read in these hymns of common women, of secret births, of gamblers and thieves. There is also a curious hymn which indicates that the complicated law of inheritance, one of the peculiarities of the existing Hindu law, was to some extent in use at one of the periods of the R'igveda hymns The institution of caste, however, seems to have been unknown; for there is no evidence that the names later current for distinction of caste were used in the same sense by these poets. See Wilson's *R'igveda*, I., re-edited by F. E. Hall, II., III.; and IV., ed. by E. B. Cowell (Lond. 1850–66).

The only recension in which the Sanhitâ of the R'igveda has been preserved to us is that of the *S'âkala* school. The number of *padas*, or words, in this Sanhitâ is stated at 153,826. In eight out of the ten Man'd'alas or divisions, the first hymn or hymns are addressed to *Agni;* the next hymn or hymns generally to *Indra;* after these come hymns to the *Vis'we Devâs*—the deities collectively—or hymns to other special deities. The text of the Sanhitâ, with the commentary of Sâyan'a, has been pub. by Prof

Max Müller. Of translations, the first vol. of one by Max Müller appeared 1869; that by Prof. H. H. Wilson follows the commentary of Sâyan'a, based on Hindu tradition; that begun by Prof. Benfey in the journal *Orient und Occident* (Gött.) is essentially speculative.

The Brâhman'a portion of the Rigveda is preserved in two works only—the *Aitareya Brâhman'a;* and the *Sânkhâyana*, or *Kanshîtaki-Brâhman'a.* The following are specimens from the former, showing the manner in which works of this category enjoin sacrificial rites and explain their secret meaning. The first relates to the ceremony of carrying the Soma (q.v.). Vâch, the goddess of speech, having been sold under the form of a woman to the Gandharvas in exchange for the king Soma, whom the gods desired, afterward returned to the gods; and the Brâhman'a proceeds thus: 'In imitation (of this precedent), men drive away an immaculate cow of one year's age, this being the price at which they purchase the king Soma. This cow may, however, be rebought; for *Vâch* returned to the gods. Hence the Mantras, after Soma has been bought, are to be repeated with a low voice. After Soma has been bought, the goddess of speech is with the Gandharvas; but she returns as soon as the ceremony of carrying the sacred fire is performed.'

The following are speculations of this Brâhman'a on the meaning of the sacrificial animal: 'The man who is initiated (into the sacrificial mysteries) offers himself to all deities. Agni represents all deities, and Soma represents all deities. When the sacrificer offers the animal to Agni and Soma, he releases himself from being offered to all deities. Some say: "The animal to be offered to Agni and Soma must be of two colors, because it belongs to two deities." But this precept should not be attended to. A fat animal is to be sacrificed, because animals (compared to the sacrificer) are fat, and he (compared to them) is lean. When the animal is fat, the sacrificer thrives through its marrow. Some say: "Do not eat of the animal offered to Agni and Soma: who eats of this animal eats human flesh, because the sacrificer releases himself (from being sacrificed) by means of the animal." But this precept, too, should not be attended to. The animal offered to Agni and Soma was an offering to Indra, for Indra slew Vritra through Agni and Soma; . . . and they receive (now as their food) the animal which is sacrificed the day previous to the Soma feast. This is their everlasting portion chosen by them; hence one ought to take pieces of it, and eat them.' See M. Haug's ed. and transl. of the *Aitareya Brâhman'a* (II., 59, 78), I., II. (Bombay 1863).

The principal object for which the *Sâmaveda* was compiled is the performance of those sacrifices of which the juice of the Soma (q.v.) plant is the chief ingredient; of which sacrifices the most important is the *Jyotisht'oma.* The Sanhitâ of the Sâmaveda is preserved in two recensions: one of the *Rân'âyanîya* and probably also one of the *Kauthuma* school. The text, in the Rân'âyanîya re-

cension, has been ed. and transl. by Dr. J. Stevenson (Lond. 1842–3) and by Prof. Th. Benfey (Leip. 1848).

The number of *Brâhman'as* relating to the Sâmaveda is by the native authorities given as eight. A later Brâhman'a, probably of modern date, also the *Vans'a-Brâhman'a*, have been ed. by Prof. A. Weber.

The history of the Yajurveda is marked by an important dissension between its own schools, known by the distinction between a Yajurveda, called the *Black*, and another, called the *White Yajurveda*. There is reason to assume that the division took place after the time of the grammarian Pân'ini (q.v.). The Black is the older of the two the White contains texts not in the Black, and, compared to the motley character of the former, it looks 'white' or orderly. The more orderly arrangement of the White points to a period when the material of the old Yajus was brought into a system consonant with prevalent theories, literary and ritual. The contents of both divisions are similar in many respects. Two of the principal sacrifices of which they treat are the *Dars'apûrn'amâsa*, or the sacrifice to be performed at new and full moon, and the *As'wamedha*, or the horse-sacrifice, at which 609 animals, domestic and wild, were tied to 21 sacrificial posts. The text of the Black Yajurveda is extant in two recensions (see publications by Dr. E. Roer and E. B. Cowell in *Bibliotheca Indica* [Calcutta 1860–64]). The *Vâjasaneyi-Sanhitâ*, or the Sanhitâ of the White Yajurveda, exists in the recensions of two schools; in parts ed. by Prof. A. Weber (Berlin 1852). The principal Brâhman'a of the Black Yajurveda is the *Taittirîya-Brâhman'a* (see pub. by Baboo Rajendralâla Mitra [Calcutta 1860–65] in *Bibliotheca Indica*). That of the White Yajurveda is the *S'atapatha-Brâhman'a*, most complete and systematic of all Brâhman'as; ed. by Prof. A. Weber (Berlin 1855).

The Atharvaveda has no circle of sacrifices assigned to it: its object is to teach how to appease, to bless, to curse, etc. Prof. Whitney (one of its editors) remarks that its most prominent characteristic 'is the multitude of incantations which it contains; . . . directed to the procuring of the greatest variety of desirable ends,' from long life, or the downfall of enemies, 'down to the growth of hair on a bald pate.'—*Journal of the American Oriental Society*, III., 308. The adherents of the Atharvaveda argue that the three other Vedas enable a man to fulfil the *dharma*, or religious law, but that the Atharva helps him to attain *moksha*, or eternal bliss. This doctrine is laid down, e.g., in the *Châlika Upanishad* of this Veda, when it says: 'Those Brâhmans and others who know the science of the (neuter) Brâhman contained in the *Brahmaveda* become merged in Brâhman.' Its frequent name *Brahmaveda* is held to indicate it as the Veda which contains the mysterious doctrine of Brahman, the supreme spirit, into which the human soul becomes finally absorbed. It seems thus to have become invested, in the mind of its followers, with a spiritual character, afterward developed in the numerous Upanishads (q.v.) now connected with it. Its text is pre-

served only in the *Śaunaka* school. Its Sanhitâ has been edited by Profs. R. Roth and W. D. Whitney (Berlin 1856). The only existing Brâhman'a of this Veda is the *Śaunaka*- or *Gopatha-Brâhman'a* (see Müller, *Anc. Sanskrit Lit.* 452).

For the theosophical works which grew out of these Vedas, see UPANISHAD; and for the works composed in order to secure correct reading and understanding of the Vedic texts, and correct performing of sacrificial acts, see VEDÂNGA.—At a later period the name Veda was given also to *Itihâsas*—legends or legendary works—and *Purân'as* (q.v.), collectively; but in this sense it never obtained currency. *Upavedas*, or minor Vedas, sometimes mentioned, are various ancient works on medicine, music, archery, mechanical science, etc.

In the preceding brief outline of the four Vedas, the question as to the date of their composition has not been raised, because in the present condition of Vedic philology an answer could be only hypothetical. From astronomical facts, based on a statement in a Vaidik calendar, Colebrooke concluded that this calendar was written in the 14th c. before the Christian era (*Miscell. Essays*, I., 109, 110); and though subsequent writers have questioned the full correctness of this conclusion, those most trustworthy admit that the error, if any, could not lessen the antiquity of this calendar by more than 100 or 200 years. As this calendar must have been composed after the R'igveda had been arranged, and as such an arrangement would probably be posterior to the date of its last hymn, a full scope is left for imagination. Scientific research has as yet not yielded any means either to check or to prompt this work of imagination; nor is there any prospect that future discoveries in Sanskrit literature will supply this lack. As to the *relative* age of these Vedic writings, there is much already brought forward in this respect to prove that there are R'ishis ancient and less ancient; that there are R'igveda hymns older than others (see Müller's *Anc. Sanskrit Lit.*). The theory, however, is utterly baseless that all the Brâhman'as belong to one period, and all the hymns to a period preceding. It is certain that a Brâhman'a of the R'igveda must be posterior to those hymns of the R'igveda Sanhitâ which it mentions; also that a Brâhman'a of the Sâmaveda must be younger than the hymns of the Sâmaveda on which it relies: but no inference can hence be drawn as to the periods of *all* the Brâhman'as and of *all* the hymns. (See the *Hymns of the R'igveda in the Sanhitâ and Pâdu Texts*, by F. Max Müller, 2 vols.)

VEDÂNGA, *vā-dâng'gâ* [from *Veda*, and *anga*, limb; literally, 'the limb of (the body of) the Veda']: six Sanskrit works, whose object is to teach how to read and understand correctly the Vedic texts, and how to apply them to sacrificial purposes—treating, in this view, of a variety of subjects.—At a later period, these works were supplemented by a similar class of works, which, however, merely describe the domestic ceremonies—e.g., the marriage rite, rites to be performed at various periods before a child's birth, at his birth, at naming him, cutting his hair, etc. Still later a further supplementary class of works was produced; then these two last classes of Sûtras (q.v.)—not comprised among the Kalpa (q.v.) works—grew into the *Dharma-s'âstras*, or law-books, of which that of *Manu* is chief representative. (See Müller's *Anc. Sanskrit Literature*).

VEDÂNTA, *vā-dân'tâ* [from *Veda* (q.v.), and *anta*, end; literally, 'the end or ultimate aim of the Vedas']: second great division of the *Mîmânsâ* (q.v.) school of Hindu philosophy—being also the most impressive structure of that philosophy. It is the most intellectually developed creed of Hinduism; and on it as a basis the popular forms of Hindu religion are reared. The germs of the V. are in the Mantras of the Veda: see VEDA. It is concerned chiefly in the investigation of *Brahman* (neuter), or the supreme spirit (see BRAHMA), and the relation in which the universe, and especially the human soul, stands to it; and in contradistinction from the *Pûrvamîmânsâ*, or the investigation (*mîmânsâ*) of the former (*pûrva*) part of the Vedas—viz., the Sanhitâ, and especially the *Brâhman'as* (see VEDA)—which contain the *dharma*, or religious law (see MÎMÂNSÂ), it is called also *Uttara-mîmânsâ*, or the investigation (*mîmânsâ*) of the latter (*uttara*) part of the Vedas—viz., *Aran'yakas* and *Upanishads* (q.v.), which treat of (the neuter) *Brahman*, or the supreme spirit [not to be confounded with (the masculine) *Brahman*, or the god of the mythological *Trimûrti* (q.v.)]. Sometimes it is named 'the investigation of the soul.' In its method, the V. differs (1) from the *Nyâya* (see NYÂYA and VAIS'ESHIKA) by endeavoring to explain the universe as a successive development from one ultimate source or principle—whereas the Nyâya, in both its divisions, treats of the objects of human knowledge of which the universe is composed, under different topics, unconcerned about their mutual relation of effect and cause; (2) from the *Sânkhya* (see SÂNKHYA and YOGA), inasmuch as that system is based on the assumption of a duality of principles whence the universe derives its origin. See INDIA—*Religion*.

The object-matter of the V. is the proof that the universe emanates in a successive development from a supreme spirit or soul, which is called *Brahman*, or *paramât man*; that the human soul is therefore identical in origin with Brahman; that the worldly existence of the human soul is merely the result of the soul's ignorance of this sameness between itself and the supreme spirit; and that its final liberation or freedom from Transmigration (q.v.)

Is attained by a removal of this ignorance—that is, by a proper understanding of the V. doctrine.

According to this doctrine, *Brahman* (neuter) is both the efficient and material cause of the world, creator and creation, doer and deed. It is one, self existent, supreme, as truth, wisdom, intelligence, and happiness; devoid of 'the three qualities,' in the sense in which created beings possess them; and at the consummation of all things, the whole universe is resolved or absorbed into it. From Brahman individual souls emanate, as innumerable sparks from a blazing fire. The soul, therefore, is neither born nor does it die; it is of divine substance, and, as such, infinite, immortal, intelligent, sentient, true. Its separate existence, as distinct from Brahman, is the cause of its ignorance; and this ignorance, which consists in regarding the world as a reality capable of subsisting without Brahman, has a double power—that of enveloping and projecting. By means of the former, it makes the soul liable to mundane vicissitudes, e.g., the sensations of pleasure, pain, etc. The projective power of ignorance, when encompassing the soul in its fourth condition, or that of pure intellect (its other conditions are waking, dreaming, and dreamless sleep), produces out of the darkness which then prevails the 5 subtile elements—viz., *ether*, which is the substratum of the quality sound; *air*, which arises from ether, the substratum of touch; from air, *fire or light*, the substratum of color; from light, *water*, the substratum of savor; and from water, *earth*, the substratum of smell. From these subtile elements are then produced 17 subtile bodies and the 5 gross elements. The subtile bodies, called also *linga-s'arîra*, because they are bodies (*s'arira*) which impart to existing beings their individual character (*linga*), are: (1) *the five organs of perception*—viz., the organs of hearing, touch, sight, taste, smell, which arise severally from the *pure* or *inactive* particles of each of the subtile elements: (2) *two intellectual organs*, produced from the *mingled pure* or *inactive* particles of the subtile elements—viz., *buddhi*, understanding, whose function is to arrive at a certainty or conclusion, and *manas* (an organ of volition and imagination), whose function consists in willing and doubting—thinking and referring the external objects to one's own self being two functions common to both of them: (3) *the five organs of action*—viz., the voice, the hands, the feet, the organ of excretion and that of generation, severally produced from the *foul* or *active* particles of each of the subtile elements: (4) *the five vital airs*, produced from the *mingled foul* or *active* particles of the subtile elements—viz., the air breathed forth, which has its place in the forepart of the nose; the air breathed downward, which has its place in the lower intestines; the air which circulates through the whole body; the ascending air, which has its place in the throat; and the descending air, in the middle of the body, which causes assimilation and digestion of food, produces semen, excrements, etc. (Later Vedântists assume ten such vital airs—viz., besides the foregoing, the airs which severally cause retching,

winking, hunger, yawning, and fattening.) The five *gross elements* are the five subtile elements, when, according to a theory derived from a scriptural text, they have become so divided and combined that each of them retains a preponderating portion of itself, and consequently of the quality of which it is the substratum—as ether of sound, etc.—and, besides, smaller portions of the other subtile elements, and the qualities of which they are the substrata. From these gross elements then arise the various (mythological) worlds, and this world too, with bodies which are distinguished as viviparous, or those produced from a womb, as men, beasts, etc.; oviparous, or those produced from an egg, as birds, snakes, etc.; those generated by 'sweat' or hot moisture, as lice, gnats, etc.; and those germinating, as creepers, trees, etc. The soul, when existing in the body, is incased in a succession of 'sheaths.' The first or interior 'sheath' consists of *buddhi*, associated with the organs of perception; the second, of *manas*, associated with the organs of action; and the third, of the vital airs together with the organs of action. These three 'sheaths' constitute the subtile body of the soul, which attends the soul in its transmigrations; and the collective totality of such subtile bodies is the supreme soul, as regarded in its relation to the world; when it is also called 'the soul which is the thread,' or passes like the thread through the universe, or Hiran'yagarbha, or life. The fourth and exterior 'sheath' of the soul is composed of the gross elements; and the collective aggregate of such gross bodies is the gross body of the deity. This whole development being merely the result of ignorance, the soul frees itself from its error by understanding that the different stages in which this development appears do not represent real or absolute truth; and when its error has completely vanished, it ceases to be reborn, and becomes reunited with Brahman, whence it emanated. But since the means of arriving at a final deliverance can be found in only the complete mastery of the truths of the Vedânta, other means, such as the performance of sacrifices or other religious acts enjoined by the Vedas (q.v.), or the practice of Yoga (q.v.), cannot lead to the same result. They may be meritorious, and are even recommended as such, but can effect only an apparent liberation. Of this liberation there are two kinds: one liberation which is effected in lifetime, and enables a man to perform supernatural actions or wonders, as the evocation of the shades of progenitors, going anywhere at will, and similar feats; and another which takes place after death, and enables the soul, not divested of its subtile body, to reside in heaven; but after a time its effect ceases, and the soul has to renew its mundane existence. In order to fit the mind for meditating on these truths, various moral duties are enjoined, and various practices are recommended, especially by later V. writers. Thus, the student of the V. is told not to hurt a sentient being, to speak the truth, not to steal, to practice continence, and not to accept gifts; to remain pure and content, to do penance,

and to study the Vedas; also to remain in certain postures, to practive various modes of suppressing his breath, and the like. These injunctions, however, are extraneous to the doctrine itself, and appear to be a compromise between the old orthodox faith, which requires the performance of religious acts, and a later stage of it, which favors such austere practices as are especially known by the name Yoga (q.v.): see INDIA—*Religion*. The doctrine of bhakti, or faith, does not belong to the older Vedanta; it is, however, an interesting feature of the later periods in his philosophy: and the same observation applies to the doctrine of *Mâyâ* (q.v.), or illusion, according to which the world has no reality whatever, but is merely the product of imagination; for the older Vedanta, as noted above, teaches merely that the world is not *the truth*, but does not deny its material reality.

The oldest work on this philosophy is attributed to *Bâdarâyan'a*, or *Vyâsa* (q.v.), and is written in the Sûtra (q.v.) style; it is called the *Brahma-Sûtra:* the most important commentary on this work is by *S'ankarâchârya* (q.v.). The text of the Sûtras and this commentary have been ed. at Calc. 1818; also, with a gloss. on the latter, in the *Bibliotheca Indica*, Calc. 1863. See Monier-Williams' *Hinduism* (1877) for a brief *résumé* of the system; Colebrooke's *Essays* (1873); Gough's *The Philosophy of the Upanishads* (1882); Max Müller's *Three Lectures on Vedānta Philosophy* (1894); and the translation in *The Sacred Books of the East.*

VEDDAH, or VEDAH, n. *vĕd'â* [native name]: in *ethnol.*, a tribe inhabiting the forests of the interior of Ceylon, probably either the aborigines, or outcasts from the Singhalese. They live in a primitive state, ruled by their own chiefs, and conceal their villages in the depths of the jungle as far as possible from the beaten paths. Their language differs but little from the common Singhalese. They seldom speak; and travelers report that they never laugh. In 1890, they numbered only 200-300.

VEDDER, DAVID: Scottish poet: b. Deerness, Orkney, 1790; d. Edinburgh 1854, Feb. 11. He went to sea when very young, became captain of a whaler at 22, was appointed first officer of an armed cruiser in 1815, and in 1820 became tide-surveyor, an office he occupied until his retirement on a pension in 1852. He appears to have written poetry at an early age, but his first published verse was *The Covenanters' Communion, and Other Poems* (1828). His poetry is graceful and fluent, and possesses both humor and pathos. His work includes: *Orcadian Sketches* (1832); *Life of Sir Walter Scott* (1832); *Poems —Legendary, Lyrical, and Descriptive* (1842); *Story of Reynard the Fox* (1852); etc.

VEDDER, ELIHU: American painter and modeler: b. New York 1836, Feb. 26. He studied painting with Mattison at Sherburne, N. Y., and in 1856 became a pupil of Picot in Paris. In 1857-61 he worked in Italy, then re-

turned to the United States, where he found himself disqualified for enlistment as a soldier by a defective arm. Returning to Paris in 1865, he remained there till January, 1867, when he went to Rome, where he has since resided. His subjects are mostly ideal, and his work is characterized by great imaginative power and originality, with boldness and intensity of expression, qualities which impart to it a heroic cast. His oil paintings include the *Phorcydes;* the *Cumæan Sibyl; The Greek Actor's Daughter; Roman Girls on the Seashore; Venetians on the Main; The Lair of the Sea-Serpent; The Roc's Egg; The Crucifixion;* and others. His reputation was greatly increased by his illustrations of Edward Fitzgerald's *Omar Khayyám* (1884), and his decorations, subsequent to 1892, are marked by his significant characteristics. He has designed many illustrations for Shakespeare. Examples of his work in this style may be seen in the pieces called 'Good and Bad Government' in the Library of Congress, Washington, and in a panel which he executed for Bowdoin College.

VEDDER, Henry Clay, A.M., D.D.: American Baptist church historian: b. De Ruyter, N. Y., 1853, Feb. 26. He was graduated from the University of Rochester in 1873 and from the Rochester Theological Seminary in 1876. He was associate editor of *The Examiner* 1876-92, and editor-in-chief 1892-4; and also edited *The Baptist Quarterly Review* (1885-92). Since December, 1894, he has been professor of church history in Crozer Theological Seminary, at Chester, Pa. Among his published works are: *Baptists and Liberty of Conscience* (1883); *The Decline of Infant Baptism* (1890); *A Short History of the Baptists* (1891); *American Writers of Today* (1894); *The Decline of the Apostolic Succession in the Church of England* (1894); *A History of the Baptists of the Middle States* (1898); *The Baptists* (1903); and contributed articles to *Heroes of the Reformation*, and *Heroes of the Faith Series.*

VEDETTE, n. *vĕ-dĕt'*, or Vidette, n. *vĭ-dĕt'* [F. *vedette*, a sentry placed without a fort or camp—from It. *vedetta*, a sentinel, outpost—from *vedere;* L. *vidērĕ*, to see, to view]: a mounted sentinel placed about 300 ft. in advance of the outposts of an army, to keep strict watch on the enemy's movements, and to signal immediately the approach of danger: V. to place outposts to watch the movements of the enemy. Vedet'ting, imp. Vedet'ted, pp. *vĕ-dĕt'tĕd.*

VEER, v. *vēr* [F. *virer*—from mid. L. *virārĕ*, to turn round—from L. *virĭa*, a bracelet: It. *virare*, to turn]: to change direction, as the wind; to alter its course, as a ship, by bringing the stern to the wind; 'wear'; to direct to a different course; to let out, with *out*, as to *veer out* a cable. Veer'ing, imp.: Adj. changing; varying: N. that movement of a ship in changing her course by which

her head is turned to leeward. VEER'INGLY, ad. *-lĭ.* VEERED, pp. *vērd.*

VEGA, *vē'gâ* [Ar. *al-nesr-al-wagi,* falling bird]: star of the first magnitude, *alpha Lyræ;* right ascension 18 h. 33 min., 13 s.; declination n. 38° 40′ 9″. Vega is very nearly at the zenith in the lat. of Washington, D. C., in Aug. Next to *Capella,* it is the brightest star in the n. hemisphere. Its light is intensely white. Computations of Vega's distance vary enormously. Since 1888 Vega has been under observation at Yale Observatory, and Dr. W. L. Elkins, of that institution, gives 0.10″ as the value of its parallax—corresponding to 33 'Light Years' (q.v.), or 2,000,000 times the sun's distance. Its spectrum has comparatively few lines, but the hydrogen lines are strong.

VE'GA, GARCILASO DE LA. See GARCILASO.

VEGA-CARPIO, *vā'gâ-kâr'pē-ō,* LOPE FELIX DE: Spanish poet: 1562, Nov. 25—1635, Aug. 27; b. Madrid. From his infancy he is said to have given promise of extraordinary talent. Like Pope, he 'lisped in numbers': at the age of 5 he showed fondness for poetry, and was able to read both Spanish and Latin. On the death of his father, the family, originally in good circumstances, fell into great difficulties, and was broken up. The young Lope fell to the charge of his uncle, the Inquisitor Miguel del Carpio, who spared no pains to give him a good education. He was sent to the Imperial College at Madrid, where he showed an astounding memory; and seemed advancing quietly toward the priestly state, to which he had been devoted by his uncle, when an odd whim struck the lad, and at the age of 14 he went off on a roving expedition with a comrade. But he and his companion were speedily arrested as thieves on their trying to effect the sale of a chain of gold (probably stolen from Lope's uncle), and sent back to Madrid. The returned prodigal was coolly received by his reverend relative, who declined to concern himself further with a nephew of such distinctly *lay* propensities. He, in consequence, became a soldier; and 1577 served at Terceira against the Portuguese. After this we find him in the service of Don Geronimo Manrique, Bp. of Avila, from which position he went to finish his studies at the University of Alcala. Here he was again ripening for holy orders, when again the passion of the vagabond drove him out on the world a pervert. For some time, at this period, Lope disappears from public view; and probably his adventures were of the kind which discreet biographers permit to remain in privacy. It has been conjectured that in his dramatic romance *Dorothea* he afterward incorporated some of these early experiences: if this supposition be true, the blank in his record is no loss. Graduating from Alcala, he became secretary to the young Duke of Alva, at Madrid. Later (about 1584) he married a lady of good condition, Isabella de Urbino; but his domestic felicity was

speedily cut short by a misadventure. Having had some difference with a gentleman of court, he satirized him in a filthy ballad; and on finding that he took it amiss, answered his challenge and gave him satisfaction by severely wounding him. For this, with perhaps some other offenses, Lope was thrown into prison, and afterward fled to Valencia. He returned to Madrid after two years; and soon afterward his wife died. He is said to have been deeply attached to her. Grief for her death, complicated with want of success in another of his usual love-affairs, drove him to join the *Invincible Armada*, then being fitted out for conquest of England. From this disastrous expedition he returned with a whole skin; but one of his brothers had been shot by his side. It is characteristic of Lope—who, whatever else he might be doing, was pouring forth torrents of verse—that he composed, amid the distractions of tempest and battle, a long poem, *Hermosura de Angelica*, which, as a continuation of the *Orlando Furioso* of Ariosto, has found favor even with special admirers of that poet. Shortly after his return, he became secretary to the Marquis of Malpica, and subsequently to the Count of Lemos, whose service he quitted soon after his marriage, 1597, to Donna Juana de Guardio, resolving thenceforward to trust to literature for his livelihood, since he had now become one of the most admired authors of the day, and by far the most popular dramatist. The few years immediately succeeding, he frequently afterward referred to as the happiest period of his life. At the age of seven, his son Carlos died; and soon afterward, in giving birth to a daughter, his wife also died. The double blow was severe. A mistress, indeed, remained to console him, Donna Maria de Luxan, by whom he had a boy and girl, the latter of whom, Marcela, was the most beloved of all his children. But he had perhaps grown weary of Donna Maria; and about this time he began to turn his thoughts seriously to religion, after the fashion in which he conceived of it. Accordingly, after an interval of devout preparation, he became, 1609, a priest of the order of St. Francis. Of his zeal in his new functions, there is evidence in the fact that 1623, Jan., he took prominent part in the ceremony of burning a heretical brother of his order. In 1627 Pope Urban VIII. sent him the degree of doctor of theology. As to his performance of priestly duty otherwise, little is known; but it is certain that, with his old unremitting assiduity, he continued to pour forth poems and dramas, not always of a clerical or decent kind. He long held illicit relations with a married woman, whose daughter by him was publicly baptized at San Sebastian in Madrid, 1617, Aug. 26. This, however, was in his earlier priestly career. It would be natural to judge the man entirely a hypocrite in his turning to religion; yet such a sweeping judgment is not *necessary* in view of his nature and of the moral standards of his country and his times. It is certain that in

his last years he fell into a profound religious melancholy. Despite the decay of his strength, he became rigorous in keeping himself up to the severest mark of discipline; in particular, he scourged himself terribly. Finally, for penance, he gave himself a scourging so severe that the walls of the chamber were found bespattered with his blood; and some days afterward he died of it, at the age of 73.

Lope was the idol of his contemporaries; and on the fruits of his labor he lived in Madrid in what might be called splendor, when the greater Cervantes was nearly starving in the same street. To such an extent was the popular admiration of him carried, that his very name became a synonym of excellence; and people spoke of a Lope jewel, a Lope poem, or the like, as one of unsurpassable perfection. For a long time nobody else than Lope de Vega-Carpio was willingly heard on the Spanish stage; and his fame abroad (especially, of course, in Italy and in France) was almost as remarkable. In the Spanish world of letters he was as absolutely dictator as was Voltaire a century and a half later in France. In one quality, at least, Lope must be held to have surpassed all other poets—his productiveness was portentous and without parallel. Setting aside his other multitudinous performances, the dramas on which his popularity mainly rested, and which have since perpetuated his fame, have been calculated to number not less than 1,800. He himself, in one of his latest works, more modestly puts them at more than 1,500, and assures us that to write a whole drama in a day was no unusual feat with him. Even if in this there be something of the fabulous, there remain in print nearly 600 of these pieces; and it is certain that many of his acted plays have not in this form survived. In view of the quantity of his work, its quality is equally surprising. His fertility of invention is marvelous; the ease and grace of his versification are unsurpassed in the language in which he writes; and his pieces, even when slight in substance, are instinct with life and dramatic movement. His drama has been well pronounced the drama of intrigue, not of manners nor of character. In deep and serious qualities he is deficient; on which ground he is now ranked below his immediate successor, and sometime contemporary, Calderon. With this single exception, he remains the chief ornament of the Spanish stage, and a notable figure in the dramatic literature of the world.—An intelligent and full survey of his works, so far as the amazing mass of them permits it to be full, is in Ticknor's *History of Spanish Literature.*

VEG'ETABLE CHEM'ISTRY: the chemistry of plants —a subject so extensive that it is impossible here to give much more than an enunciation of the most important propositions, with little of proofs or details. On submitting to incineration a plant which has been dried at moderate heat till it ceases to lose weight, we find that the

residue, which consists of mineral salts and a little carbon, is much lighter than the original plant, the portion which is burned off, or apparently lost, corresponding to the organic constituents of the plant. Hence every plant, like every animal, is composed of *organic* and *mineral* or *inorganic constituents*. While the mineral constituents of the plant are found also in the crust of the earth, the organic constituents are formed primarily in the plant itself from inorganic matters—viz., from *water, atmospheric air,* and the *soil,* which three collectively may be termed the food of plants.

The following general principles may be laid down regarding the organic constituents which mainly contribute to form the bulk of the body of the plant: (1) All organic constituents of plants contain *carbon*. (2) All such organic constituents contain *hydrogen:* some, e.g., many ethereal or volatile oils, consist solely of these two elements. (3) The greater proportion of these compounds contain *oxygen* in addition to the two preceding elements: to this class belong those constituents of plants which are at the same time of most general diffusion and of greatest physiological and economic importance—viz., the so-called *carbo-hydrates,* which consist of carbon combined with hydrogen and oxygen in the exact proportion in which the last two elements form water. Under this title are included cellulose, starch, gum, etc. Other organic constituents contain not only carbon with hydrogen and oxygen in the above ratio, but an excess of oxygen. In this category may be placed almost all the *organic acids,* many *ethereal oils, wax,* the *resins,* many of the so-called *glycosides,* and the *fats*. (4) With the above elements *nitrogen* is associated to form two very important groups of constituents—viz., the *organic bases* or *alkaloids* and the *albuminates* or *proteine bodies*. Although the nitrogenous groups never form more than a small part of the mass of a plant, nitrogen is never altogether absent from a plant. (5) In association with all the above named elements, *sulphur* in small quantity is present in the albuminates of all plants; in association only with carbon and hydrogen, it occurs in oil of garlic and oil of asafetida; and when combined with carbon, hydrogen, and nitrogen, it has been as yet found only in oil of mustard. Whether *phosphorus* in very minute quantity occurs in any of the vegetable albuminates is still uncertain.

The inorganic constituents found in the ashes of all plants are: *potash, soda, magnesia,* and *lime,* in combination with *phosphoric, sulphuric, hydrochloric,* and *carbonic acids,* and, additionally, *iron, manganese,* and *silica,* with traces of *fluorine;* while the marine plants or sea-weeds contain also appreciable quantities of *bromine* and *iodine*. *Alumina* and *baryta* also are occasionally found, as also are *nitrates* in certain plants. The carbonates almost always found in the ash are formed mostly by the action of the incineration on the salts of the vegetable acids,

such as the acetates, citrates, etc.; and probably in some other respects the arrangements of the constituents of the ash are not precisely identical with those of the mineral ingredients while existing in the actual plant. Among the most essential of the inorganic constituents is *water*, which acts as a solvent for the matters dissolved in the vegetable juices, and forms a very preponderating part of the mass, amounting sometimes to from 86 to 96 per cent of the whole plant. From the preceding remarks it is obvious that the nutrition and development of plants is dependent on their absorbing *carbon-compounds, hydrogen-compounds, nitrogen-compounds, sulphur-compounds, water,* and such *inorganic compounds* as yield the necessary inorganic constituents in a form capable of assimilation; together with the presence of *oxygen*, requisite for formation of organic oxygenous compounds.

The assimilation of *carbon* first claims our attention. The composition of the atmospheric air, from whatever part of the earth's surface it is taken, is constant, so far as the relative volumes of oxygen and nitrogen are concerned; while the variations in the carbonic acid, except when there are obvious causes for an excess (e.g., an overcrowded room), are very slight, and, as a general rule, deviate scarcely at all from 4 vols. in 10,000 of air. Yet causes disturbing this uniformity are perpetually at work. Prof. Mulder, adopting Lavoisier's and Davy's experiments, according to which a man consumes about 26 cubic feet of oxygen in 24 hours (but later observers place the daily quantity at 45 cubic feet), calculated his yearly consumption at more than 9,500 feet. Considering the enormous numbers of men and animals on the surface of the globe, and the lamps, fires, furnaces, etc., ever burning, the atmosphere would apparently soon cease to be fit for the support of life, (1) in consequence of the great diminution of oxygen, a gas essential to life; (2) in consequence of the great excess of carbonic acid, a gas deleterious to life. The cause of this marvelous uniformity of atmospheric air under these circumstances is that function of plants by which they absorb their carbon. It is to the experiments and observations of Priestley 1771, Ingenhousz 1776, Senebier 1807, and many later observers, that we are indebted for the knowledge of the great general fact that plants take up the carbonic acid from the air, reduce it in their organism, and retain the carbon for the composition of their own organisms, while they restore the oxygen gas to the atmosphere. It is chiefly by the leaves, which may be regarded as the respiratory organs, that this process is carried on. It is needless here to notice the questions as to whether it is only during light, or constantly, that these changes go on; whether different rays of the spectrum act with more or less power in liberating the oxygen; etc. Independently of the proof afforded, e.g., by placing green plants in a mixture of 70 parts of common air and 30 parts of carbonic acid, and finding that

after four hours the carbonic acid has been almost entirely replaced by oxygen, we have obvious evidence in lichens growing on a naked rock that the carbon which they contain must be obtained from the atmosphere. In aquatic plants the process is identical, the atmospheric air being dissolved in the water. Carbon, in some form of combination, probably forms about two-thirds of the weight of a dried plant. The assimilation of *hydrogen* from the decomposition of water in and by the plant, is not capable of the same direct proof as that of carbon; but there are grounds for believing in its occurrence. This view is supported by the composition of wax, the resins, volatile oils, etc.; indeed it is difficult to see from what other source the hydrogen could be derived. In that case the water, like the carbonic acid, contributes its oxygen to the air. The *nitrogen,* which enters into certain constituents of plants, is derived from ammonia, and not, as might have been supposed, directly from the air, of whose volume it forms about four-fifths. It has been shown by the direct observations of Boussingault that plants cannot assimilate nitrogen; that those which have been made to absorb it by placing their roots in nitrogenous water throw it off unchanged; and that vegetation cannot exist in a soil which contains no substances readily convertible into ammonia. The indifference of nitrogen to other elements, and the extreme readiness with which ammonia becomes decomposed, and enters into different combinations (the amides, imides, amido-acids, compound ammonias, probably also the albuminates, being derivatives of it), together with the conclusion drawn from the action of liquids containing ammonia, or matter convertible into it, e.g., gas-liquid, fluid sewage, etc., confirm this view. The ammonia taken up by plants is obtained partly from the air, partly from the soil. In the air it is formed after thunderstorms, and it is further supplied to the atmosphere by putrefactive processes, animal excretions, and volcanic action. It is indeed found in snow and in all rain-water, and is thus conveyed to the soil. Although direct experiments show that the air contained in the pores of the soil is richer in ammonia than ordinary atmospheric air, it is easy to show that a plant can derive its ammonia from the latter alone, by a reference to the vegetation on naked rocks, or by growing plants in powdered charcoal duly moistened with rain-water. Hence both air and soil contribute the ammonia from which the nitrogen is fixed in the plant. The *oxygen* which occurs in the various constituents of the plant is derived from the decomposed carbonic acid and water, and corresponds to the difference between the amount contained in those absorbed compounds and the amount liberated to the atmosphere. The *sulphur* that occurs in the albuminates and certain ethereal oils must be derived from the soil, since it does not occur either free or in combination in the air; and as the only form in which it is found in common soil is

as sulphates, plants must have the property of decomposing these salts, and appropriating their sulphur after reduction. Extensive experience has proved that certain *inorganic constituents* are as indispensable to the life and development of the plant as the organic elements that we have been considering; and further, that special plants require special inorganic constituents (see works on agricultural chemistry). The two following facts seem established: (1) that the roots of plants exert a special selective power, and absorb some salts, and reject others that are also in solution in the water of the soil; (2) that the top or vegetable soil has the power of absorbing and retaining the most necessary mineral ingredients, and does not allow them to be carried deep into the ground by the rain; but for discussion of this subject, see experimental researches of Liebig, Mulder, Huxtable, Way, etc. It would be out of place here to enter into the consideration of the prodigious synthetic and analytic power of the vegetable cells.

VEGETABLE FOOD, VALUE OF: the function of food is to build up the tissues of the body and keep them in repair, to yield energy in the form of heat, to keep the body warm, and to create strength to enable it to do its work. A diet to accomplish all this must contain the nutrients, water, nitrogenous substances, or proteids (classified as protein), also fats, carbohydrates (sugar, starch, cellulose, etc.), and mineral matters, such as sodium chloride (common salt) and phosphate of lime. Animal foods, meat, eggs, cheese, etc., are rich in protein, but not in carbohydrates. With the exception of butter, lard, and the fat of pork, they yield but little heat, and as a rule should be associated with other foods to form a complete diet. Cereals (corn, wheat, etc.), on the other hand, though classed among the vegetable foods, furnish a very large proportion of the actual nutrients in the ordinary diet, and more economically than animal foods, for which they may be substituted. Combined with milk, fruit, and nuts, they form a complete diet. Vegetables as a rule are deficient in fat and protein, but rich in carbohydrates, and some of them contain beneficial juices and salts. While a vegetable diet is often of great service in neurasthenia, gastric neurosis, etc., for healthy persons the objections to a strictly vegetable diet are based upon the large amount of material required to furnish necessary protein, the amount of residue to be got rid of by the body, and the monotony of the diet. Most of the so-called vegetarians are merely non-meat-eaters, for they consume milk, butter, eggs, cheese, and sometimes fish. The fact is that man is an omnivorous animal, his digestive apparatus is adapted for the digestion of both animal and vegetable foods, and usually he needs both in moderation. Vegetables are too often considered merely as a pleasant addition to the diet, and not a necessity. Most families

use but 12 or 15 different kinds of vegetables, whereas the large markets in our cities have for sale throughout the year about 50 varieties. The United States government has recently encouraged the increased use of vegetables, and through investigations and experiments has added to our knowledge of their food value. For example, the purslane and other so-called weeds have been found to be useful as food, and the propagation and use as food of the roots, tubers, beans, bulbs, and various plants heretofore grown and used as food almost exclusively by the Chinese, such as lily bulbs, the lotus, taro, and ginseng, are recommended to Americans. The malates, citrates, and other salts found in certain vegetables are indispensable in food, as they are converted into carbonates in the body, and furnish some of the alkalies to the blood and other fluids. Potatoes, onions, and fresh salad vegetables, such as tomatoes, cabbage, greens, lettuce, corn, and cucumbers are excellent preventives of scurvy, and in the spring, after the heavy winter diet (more or less of meat) their juices and salts are especially beneficial. These vegetables, together with oranges, lemons, limes, and apples, may well be substituted for so-called spring medicines. Vegetables are also needed for their bulk, which is an important adjuvant in maintaining the necessary movements of the intestines.

Much of the indigestion following the use of certain vegetables is due either to insufficient cooking or to the fact that the vegetables are not fresh. The Irish potato, the 'king of vegetables,' lacks protein, fat, and salts, and should be eaten with butter and salt, pot liquor, meat gravy, or fat meat, and associated with some nitrogenous food. The legumes, beans, peas, and lentils differ from other vegetables by reason of the large amount of protein they contain, as well as mineral matter, chiefly lime and potassium salts, but fat is needed with them to furnish the necessary nutrients, hence 'pork and beans.' They need also, especially when dried, to be thoroughly cooked, and are best adapted to persons who do outdoor work. The flatulence which they sometimes produce, especially in persons of sedentary occupation, constitutes one objection to their use. Legumes may well be called the 'meat of the poor.' In Mexico the frijole (a variety of bean) is the staple food next to maize; and in the Orient the soy bean and its products, bean-cheese, etc., rank next to rice. In India lentils form the staple diet. There is a Hindu proverb that says: 'Rice is good, but lentils are my life.' The Arabs feed ground beans to their horses when extraordinary exertion is needed of them. Finely ground peas, beans, and lentils form the basis of many soup-tablets, and of condensed foods used by armies, explorers, etc.

VEG'ETABLE I'VORY. See IVORY, VEGETABLE.

VEG'ETABLE PARCH'MENT. See PARCHMENT (PARCHMENT-PAPER).

VEGETABLE PHYSIOL'OGY: branch of botany which treats of the life of plants and the functions of their various organs. For the most important departments of this subject, see CIRCULATION OF SAP: FLOWER: FRUIT: LEAVES: METAMORPHOSIS OF ORGANS: PLANT: ROOT: SEED: SPORE: STEM: ETC. We shall here discuss only one subject—viz., the organs and functions of reproduction in plants. Although, as we learn from Herodotus, the Babylonians knew that there were male and female date-trees, and that the female required the concurrence of the male to become fertile, and Theophrastus, in his work *On the History of Plants*, and other ancient authors, frequently mention the sexes of plants, yet Cæsalpinus, who died at Rome 1603, seems to have been the first writer who directed his attention to the reproductive organs of plants, and he speaks vaguely of an emanation from the male causing fertility in the female; and Grew, 1676, seems to have been the first who distinctly recognized the functions of the stamens and pistils. Ray, in his *Historia Plantarum*, 1694, adopted and enforced Grew's view; and Geoffroy, 1711, supported the same view in a Memoir before the Royal Acad. Linnæus, in *Systema Naturæ* (1748), made these organs the foundation of his system of classification into sexual and non-sexual plants, the former being phanerogamous, or flowering, and the latter cryptogamous, or flowerless; in the latter division of plants he could not detect stamens or pistils; and it was not till 1782, when Hedwig's work on Mosses was published, that anything was known with certainty regarding the sexual organs of any of the cryptogamia.

We proceed to consider reproduction in the phanerogamous plants. A complete flower consists of four whorls (*verticils*), placed alternately within one another, the two internal being the *Stamens* (q.v.) and *Pistils* (q.v.), which are the essential organs of reproduction; while the two external are the *calyx* and *corolla*, which constitute the floral envelopes or protective coverings. Both the stamens and the pistils originate, like the floral envelopes (see FLOWER), from the thalamus, or upper part of the axis or peduncle, in the form of minute cellular processes; and in their development they resemble leaves, though in their appearance they are less like leaves than are the floral envelopes. These parts are shown in the following diagram (fig. 1) of the flower of the vine, after it has cast its petals. There are here five stamens (the filament of one being concealed by the pistil), with introrse* two-lobed anthers. For the anatomical structure of STAMENS and PISTILS, see those titles. Additional remarks on the pollen are here given. This (the male fertilizing agent) consists of cells contained in the anther-case, and is discharged by various kinds of longitudinal, transverse, valvular, or porous dehiscence. When examined by the naked eye, it appears usually as a yellow powder;

* *Introrse* is applied to anthers which open on the side next the pistil.

but when magnified, it is found to consist of cellules of different singular forms, varying in size from $\frac{1}{300}$ to $\frac{1}{700}$ of an inch in diameter. Oval, spherical, and triangular forms of pollen are shown in figs. 2 to 6; and they may be square, cylindrical, hour-glass shaped, etc. These pollen grains are developed in the large cells in the early stage of the anther. The contents of each cell divide first into two, and afterward into four parts, each of which becomes covered with cellulose, so as to constitute independent cells or grains. These grains either burst through the parent cell, and become liberated, or they remain united in fours or some multiple of four, as in many species of acacia; or in large masses, such as those seen in Orchids and in Asclepias, when they constitute *pollinia*. Each pollen-grain has usually two coverings: the outer one, called *extine*, being a firm membrane, often marked with bands

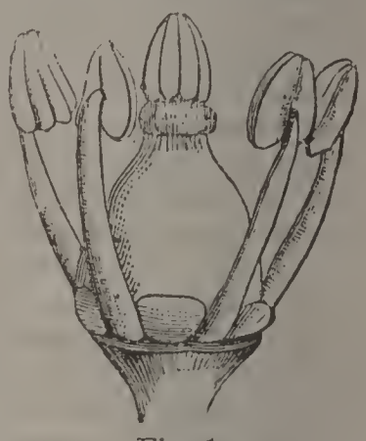
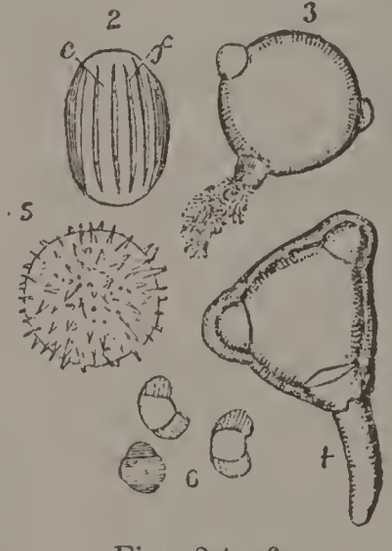


Fig. 1.

Androecium and Gymnoecium (or, in other words, the stamens and pistil) of the Vine, with the disk surrounding the base of the ovary.



Figs. 2 to 6.

Fig. 2.—Elliptical Pollen of Milkwort (*Polygala*), viewed lengthwise. Its surface, or extine, *e*, is marked with grooves or slits, *f*, where the intine protrudes. Fig. 3.—Ripe round Pollen of Cherry (*Cerasus*) discharging its fovilla through a tubular opening formed by the intine. There are two other points at which the intine is seen protruding. Fig. 4.—Triangular Pollen of Evening Primrose (*Œnothera*), with one pollen-tube protruding. This tube is formed by the intine, which is also seen projecting at the other angles. Fig. 5.—Round ripe Pollen of Hollyhock (*Alcea*), with its extine covered with prominent points. Fig. 6.—Pollen of Fir (*Pinus*), in which, by the increase of the intine, the extine is separated into two hemispherical portions marked by the dark spaces at each end of the grains.

or rough points; and the inner one, called *intine*, which is thin, and capable of extension. In the interior of the pollen-grains a minute granular matter exists, called

fovilla—the granules, which are mixed with starch and oil, varying from $\frac{1}{4000}$ to $\frac{1}{30000}$ of an inch in diameter. On moistening pollen-grains in water, they swell till the *intine* bursts at one or more points, and expels the fovilla. In the act of impregnation, the pollen is scattered on the pistil, and is moistened on one side by the fluid of the stigma (a part of the pistil composed of loose cells which secrete a viscid fluid and are uncovered by epidermis). It is then observed that the intine, instead of bursting, protrudes in the form of a tube called the *pollen-tube*. The number of these tubes varies greatly in different plants. According to Amici (as quoted by Balfour), the two pollinia (fig. 7) of *Orchis morio* contain each about 200 secondary small masses, composed of grains united in fours, and each of these small masses presents 300 openings capable of emitting tubes. In order that an embryo plant may be formed, the mature pollen must be discharged from the anther-cells of the stamen, and brought into contact with the stigma, through which, and then through the conducting tissue of the style, it must pass until it reaches the foramen, or micropyle, of the ovule. The means by which this contact is accomplished are various, such as elasticity and irritability of the stamens, the action of currents of air, and the intervention of insects passing from the male to the female plant. In the orchids, fertilization is effected by the agency of insects. The fertilizing power of pollen is retained for a different length of time in different plants: thus, in most species of Datura, and in *Lychnis dioica*, it loses its power in two days; in the wall-flower it remains efficacious 14 days; in the date, cannabis, tea, and camellia, it will keep fresh for a year; indeed, Micheaux mentions that the pollen of the date has been successfully used after 18 years. The quantity of pollen produced is much greater than is actually required for impregnation of the ovules: thus, in the Firs and Pines the quantity is enormous, probably because of the obstacles presented to their fertilization. The *sulphur showers* occurring in some districts are composed of the yellow pollen carried by the winds from pine-forests; and the showers of colored rain occasionally noticed are due to a similar cause. The number of pollen-grains in certain flowers has been calculated. In a plant of *Cereus grandiflorus*, Morren observed that there were 40 flowers, each containing 500 stamens, and that each anther contained 500 pollen-grains; hence the entire number of pollen-grains in each flower was 250,000, and in the whole plant was 10,000,000. Similarly, in an entire Rhododendron plant the pollen-grains amount to 72,620,000. The quantity required for fertilization is

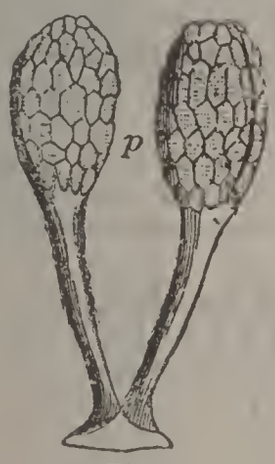


Fig. 7.
Pollinia, or Pollen-masses, of Orchis, separated from the point above the stigma, with their viscid matter adhering to them at the base. The pollen-masses, *p*, are supported on stalks.

very small—one, two, or at most three grains being sufficient to impregnate one ovule. In most cases the pollen of a single anther is sufficient for complete impregnation; the additional anthers making more sure the result. During the evolution of the stamens, and the maturing of the pollen, the pistil undergoes certain changes, of which the most important is that the stigma becomes enlarged, lax, and covered with a viscid secretion, which, besides detaining the pollen-grains, causes them to protrude their tubes, as above described; moreover, in some flowers, the style, which is sometimes covered with hairs, elongates during the discharge of the pollen, brushes the latter on to the pistil, and thus acts directly in fecundation. One of the central cells of the ovule now becomes much enlarged and developed, so as to form the embryo sac. At the end of this sac, next to the micropyle, several free nucleated cells are formed, to which the name embryo-vesicles, or germinal vesicles, has been given. In this way the ovule is prepared for the action of the pollen and for production of the embryo plant. The tubes developed by the pollen-grains, when acted on by the secretion of the stigma, pierce the stigmatic tissue, and carry the fovilla through the canal of the style to the ovule (see figs. 8, 9, and 10). In some plants the emission of tubes begins in half a minute after the pollen has been caught by the stigmatic secretion; in other plants it does not begin till after 24 hours; and it is said that in the larch the tubes do not emerge till after 35 days. The length to which the tubes extend is often very great, but the diameter is extremely small. In *Colchicum autumnale*, in which the style is 13 inches long, the length of the tube is 9,000 times the diameter of the grain from which it proceeds. The time taken by the tube to traverse the length of the style varies, but does not always correspond with the latter. In some short-styled plants the time is very long: but in the long-styled *Colchicum autumnale* the pollen-tube reaches the ovule in about 12 hours. In some coniferous plants a year is required for the process.

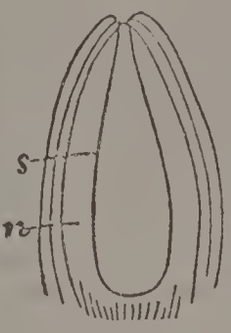


Fig. 8.
Ovule of Polygonum, showing the embryo-sac, *s*, developed in the midst of the nucleus, *n*.

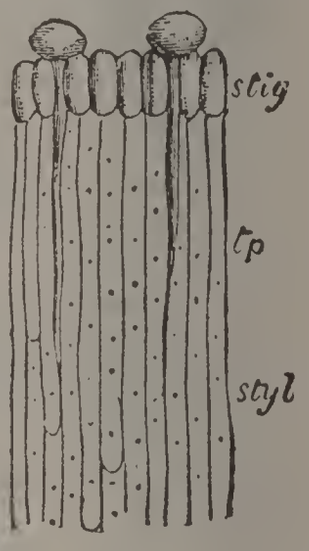


Fig. 9.
Vertical section of the upper part of the pistil of Frogsmouth (*Antirrhinum majus*). Two pollen-grains are seen lying on the stigma, *stig*. These send out tubes, *tp*, which pierce the stigma and penetrate the tissue of the style, *styl*, until they reach the ovules or young seeds.

We proceed to consider the embryogeny of (1) Gymnospermous and (2) Angiospermous Phanerogams. In the gymnospermous or naked-seeded flowering-plants, such as

the coniferæ and cycadaceæ, impregnation is effected by direct contact between the pollen and the ovule, there being no true ovary bearing a stigma. The process is thus summarized by Balfour: 'In gymnospermous plants there are stamens containing pollen, and ovules supported on cones or altered branches, and in them the pollen enters the large micropyle of the ovule without the intervention of stigma or style When the pollen reaches the nucleus of the naked ovule, it remains long dormant, and after many weeks and months sends out a tube which reaches the embryo-sac and impregnates a corpuscle. One of the cells of the corpuscle then takes an active function, and develops the embryo with the suspensor in the midst of endospermal cells.'—In the angiospermous phanerogams, when the pollen tube has traversed the tissue of the style, and reached the ovule, it

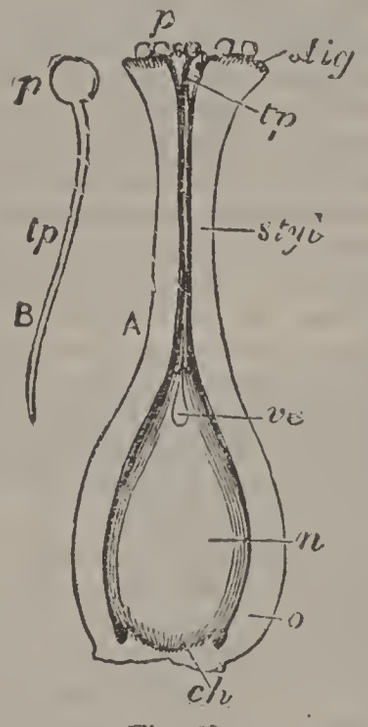


Fig. 10.

Pistil and Pollen of Polygonum. A, stigma, *stig*, with pollen-grains, *p*, adherent to it, sending tubes, *tp*, down the conducting tissue of the style, *styl*; the ovary, *o*, containing the ovule with its covering and central cellular mass or nucleus, *n*, containing a rudimentary embryo-sac *ve*, in which ultimately the embryo is developed. The base of the ovule, attached to the placenta, is marked by the chalaza, *ch*. B, pollen-grain, *p*, separated, with pollen-tube, *tp*.

proceeds through the foramen, or micropyle, so as to come in contact with the embryo-sac; and consequent on this is the development of the cellular embryo. There is, however, much dispute as to what now occurs. 'Schleiden thinks that the end of the pollen-tube introverts the embryo-sac, and in some cases perforates it, and that it becomes the first cell in the embryo. Most physiologists, however, agree in thinking that Schleiden was mistaken in regard to the extremity of the pollen-tube, and they believe that the embryo is formed from a distinct cell previously existing in the embryo sac. In some instances

the pollen-tube indents the embryo-sac; at other times it perforates it, and comes into actual contact with a cell contained in the sac. In the embryo-sac there are produced, before impregnation, certain cells, often three, called germinal vesicles, only one of which in general is impregnated by the pollinic fluid, which transudes through the membrane of the pollen-tube and the walls of the embryo sac and vesicles. After impregnation the vesicle divides by a transverse septum into two parts—the upper portion forming a confervoid partitioned filament or suspensor, and the lower becomes filled with cells, constituting the rudimentary embryo. The suspensor is attached to the part which forms the radicle of the embryo, and at the opposite end one or two cotyledons are produced, inclosing the fresh bud or plumule. An embryo is usually produced in each ovule (monembryonomy); but when more than one germinal vesicle is impregnated, there is a plurality of embryos (polyembryonomy). When the pollen of one species is applied to the pistil of another species, we occasionally find seeds produced which give rise to individuals intermediate between the two parents: these individuals are called hybrids or mules, and are rarely fertile. A plant has, however, a preference for the pollen of its own species, and hence hybrids are rare in nature.' (Balfour.)—A reference to the preceding figure of a section of part of the ovule of a species of *Speedwell* will elucidate the above summary: it shows the pollen-tube, *a*, just as it reaches the embryo-sac which contains the rudimentary embryo, *d*, attached to the sac by its, suspensor, *b*, and endospermal cells, *c*, at the lower part of the sac. The suspensor is sometimes of considerable length, and as much as three or even five times the length of the whole seed. Its attachment to the radicular end of the embryo is shown in fig. 11. In monocotyledons a single sheathing cotyledon is developed; in dicotyledons two opposite leaves; and after their formation the apex produces the terminal bud or plumule. The embryo is thus suspended in an inverted position in the seed.

Fig. 11.
Section of part of the Ovule of a species of Speedwell (*Veronica triphyllos*), showing the pollen-tube, *a*, passing through the cellular tissue of the nucleus, and reaching the embryo-sac, which contains the rudimentary embryo, *d*, attached to the sac by its suspensor, *b*, and endospermal cells, *c*, at the lower part of the sac.

It is impossible to enter into any general description of the organs or process of reproduction in cryptogamic plants. In the higher classes of this great division of the vegetable kingdom, the organs of reproduction consist usually of cellular sacs of two kinds—one called *antheridia*, containing *phytozoa* or *spermatozoids*, representing the stamens, or the male; and the other called *pistillidia* or

archegonia, and representing the pistil, or the female. These structures, in a magnified state, are shown in figs. 13 and 14, as they occur in the liverwort. In the fully developed state of the plant, the antheridia disappear, while the pistillidia are transformed into cellular sacs containing germinating bodies known as Spores (q.v.), which are considered as formed by a process of reproduction, and as analogous to cellular embryos. These spores are developed in mother-cells, whose contents often divide into four, such mother-cells being called sporidia. With regard to the antheridia and the pistillidia in the different orders of cryptogamic plants, Dr. Balfour observes that in ferns they are supposed to exist in a prothallus or cellular expansion produced by the spore when it germinates. A cell of the pistillium (the ovular body) afterward gives rise to the spore-bearing leaves (the fronds). After impregnation the archegonial cells give rise to a sporingiferous frond.

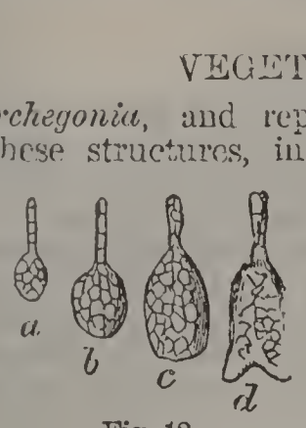


Fig. 12.

The embryo in different stages of development: *a*, Embryo in young state as a globular mass at the end of a suspensor; *b* and *c*, Embryo more advanced; *d*, Embryo showing the division into two cotyledons.

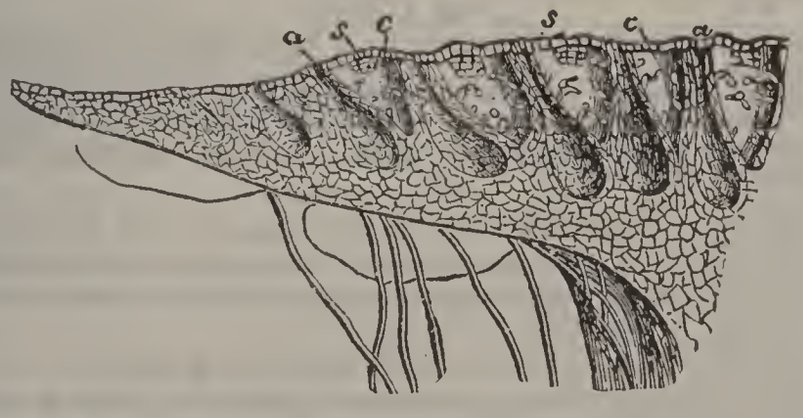
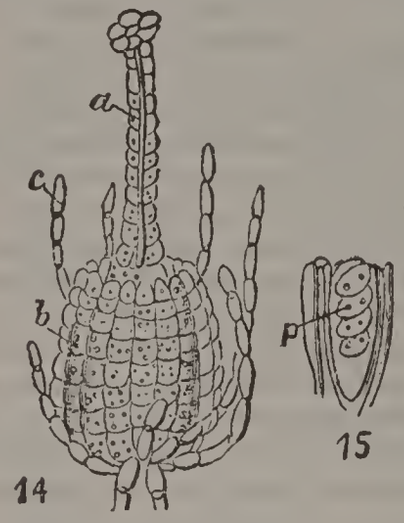


Fig. 13.

Vertical section of the disk-like receptacle of Liverwort (*Marchantia*), showing the antheridia, *a*, *a*, in its substance. These antheridia are flask-shaped sacs containing phytozoary cells. They communicate with the upper surface, and their contents are discharged through it. Between the antheridia there are air-cavities, *c*, *c*, connected with stomata, *s*, *s*.

The spores are contained in sporangia, with or without an elastic ring, developed on the back, on the side, or at the base of the leaves. In mosses these organs are seen at certain stages of the plant's growth, and they are either on the same or on different plants. After impregnation the archegonial cell gives rise to a stalked theca or sporangium with its spores. In liverworts they are usually on different parts of the plant, and as frequently in the substance or on the under-surface of disk-shaped cellular stalked expansions. Here the impregnated cell gives rise to the fruit or capsules. In lichens the existence of these organs has not yet been established; and the fructification consists of *thecæ* or *asci*, containing 4, 8, 12, or 16

sporidia (or cells containing spores) in their interior. (In fig. 15 a theca containing four sporidia is shown.) These thecæ are usually united together so as to form a cup-like mass of fructification. When mature, the sporidia or thecæ burst, and discharge the spores. The fungi, antheridia, and pistillidia are obscure, and the organs of reproduction are spores which are either naked or are contained in thecæ. In algæ, antheridia and pistillidia have often been detected; but in some of them certain cells, in the



Figs. 14 and 15.

Fig. 14.—Pistillidium of Liverwort. It is a cellular body surrounded by an involucre, *b*, and septate filaments, *c*, and is provided with a styloid calyptra. Fig. 15.— A Theca of a Lichen, containing four nucleated cells. These cells ultimately form the sporidia or sacs containing numerous minute spores. Round the theca are cellular filaments, *p*.

same or separate filaments, seem to possess the property of producing spores by a process of conjugation or union; and in the lowest forms the cells undergo division into new individuals.

Besides the above-noticed modes of propagation, cryptogamic plants are propagated also by buds or gemmæ, which are either attached to the leaves or fronds, or are contained in peculiar cup-shaped bodies. For other modes of reproduction, briefly indicated, see BOTANY; also Sachs's *Textbook of Botany* and Bessey's *Botany for High Schools and Colleges*.

VEGETA'RIANISM: the doctrine that vegetable substances are the solids intended by nature for the sustenance of man, and that it is wrong—against nature and against good morals—for men to make use of an animal diet. There have never been wanting among speculative persons some who maintained that fruits and vegetables are the proper food for men; and illustrious names, such as those of Pythagoras, Plato, Plutarch, in ancient times—of Rousseau, Shelley, Swedenborg, in modern—are among upholders of this doctrine. A society for promoting the practice of V. was established at Manchester, England, 1847; and three years later a similar society was established in the United States. V. has attracted very few disciples; and by these its advocacy has usually been conjoined with

that of temperance, peace, homœopathy, and the cold-water cure.

There is, first, a physiological argument used in behalf of V. It is said that the formation of the teeth and of the intestines in man proves that man was intended to be not a carnivorous, but a fruit and vegetable eating animal. Then it is maintained that a vegetable diet is the most favorable to man, in all respects, physical, intellectual, and moral; that with it his life is longer, his enjoyment of life greater, his brain more vigorous, and his power of manual labor not less than with an animal diet; and that, while the use of animal food begets ferocious dispositions, a carelessness about life, a callousness to the sufferings of men or animals, a vegetable diet 'develops the gentler affections, and produces a broad and genial sense of brotherhood.' It is affirmed that animal food produces febrile and inflammatory tendencies; that, like alcohol, it is a stimulant (some vegetarians call it a stimulating poison); and that a mixed diet is open to all the objections which lie against moderate drinking. It is alleged also that animal food as exposed for sale is often tainted with some disease or unwholesome condition, and it thus becomes a frequent cause of disease. Moreover, it is submitted that vegetables contain all the principles necessary for human sustenance; that, therefore, the use of flesh is unnecessary: and that, this being so, it is selfish, cruel, and tyrannical—tending, too, to increase selfishness, cruelty, and tyranny in men—to cut short the existence of the helpless inferior animals.

The opinion of physiologists is not favorable to V. The structure of man's organs is held to prove that nature intended him for an omnivorous animal—his stomach and intestines being fitted for deriving nourishment from every kind of food, and he being able, by means of cooking, to modify his food so as to prepare it for mastication and digestion. There is also almost a concurrence of medical experience against V., and in favor of the opinion that man, as regards all his powers and faculties, thrives best, and that—if a difference can be made out—he also lives longest, on a mixed diet. It has been found, in making railways, that differences between workmen in respect of bodily strength and energy were due chiefly to a difference of diet; that, for example, a beef-eating Englishman would do the work almost of three vegetable-fed Frenchmen, and that this difference of working-power disappeared when the Frenchmen took to eating beef. Upon the alleged beneficent moral influence of vegetable food, it has been observed that proof of its reality is lacking; moreover, that since the majority of mankind live either mostly or entirely on vegetables, vegetables must bear a large share of the responsibility which may fall upon diet for the evil tendencies of man; and that, in fact, the most cruel and the most debased of human races live entirely on vegetables. To the charge of cruelty brought against the practice of killing animals for food, it has been answered that the plan of nature contemplates such killing, and makes it impossible to avoid

it; that the microscope has shown us that even in taking a draught of water we may deprive a multitude of beings of life; and that, on the other hand, the system of rearing cattle for the butcher—since the cattle would otherwise not be reared at all—really adds largely to the sum of happy animal existence. It is not disputed that there is a liability to disease from the use of unwholesome meat; but, then, vegetables as well as animals are subject to diseases; and the reasoning which would drive us from the use of animal food because it may be diseased, would really cut us off from food altogether. There is probably, however, in countries where animal food is abundant, some tendency to make meat too large a portion of the diet. Moreover, different persons vary greatly in their requisite proportions of animal and vegetable food.

VEGETATE, v. *vĕj′ĕ-tāt* [mid. L. *vegetātus*, pp. of *vegetārĕ*, to arouse, invigorate—from L. *vĕgĕtus*, lively, vigorous—from *vegērĕ*, to quicken, to arouse; allied to *vigērĕ*, to flourish: F. *végéter;* It. *vegetare*, to grow, as plants]: to grow as plants; to sprout; to germinate; familiarly applied to persons, to live an idle, unthinking life. VEG′ETATING, imp. VEG′ETATED, pp. VEG′ETABLE, n. *-tă-bl* [F. *végétable*, vegetable—from L. *vegĕtābĭlis*, animating]: organized body destitute of sensation and voluntary motion, deriving its nourishment by means of roots from the earth (see VEGETABLE CHEMISTRY: VEGETABLE PHYSIOLOGY); a plant; especially an herbaceous plant used wholly or in part for the table, e.g., cabbage, cauliflower, turnips, carrots, potatoes, spinach, peas, celery, asparagus, etc.: ADJ. pertaining to plants; having the nature of plants; derived from vegetables. VEG′ETABIL′ITY, n. *-bĭl′ĭ-tĭ*, vegetable nature; the quality of growth without sensation. VEG′ETA′TION, n. *-tā′shŭn*, the process of growing, as seen in plants, by means of nourishment derived from the earth, air, or water; vegetables or plants in general; the living an idle life. VEG′ETATIVE, a. *-tā-tĭv*, growing, or having the power of growing, as plants; having the power of producing growth in plants. VEG′ETATIVENESS, n. *-nĕs*, the quality of being vegetative. VEG′ETA′RIAN, n. *-tā′rĭ-ăn*, one who abstains from the use of animal food as an article of diet; one who maintains that vegetable and farinaceous substances constitute the only proper food for man: ADJ. feeding upon vegetable food. VEG′ETA′RIANISM, n. *-ĭzm*, the theory and practice of living solely on vegetables. VEG′ETAL, a. *-ĕ-tăl*, pertaining to growth, existence, and reproduction in plants or animals: N. a plant or vegetable. VEG′ETIST, n. *-ĕ tĭst*, a vegetarian. VEG′ETOUS, a. *-ĕ-tŭs*, in *OE.*, active; frisky VEG′ETO-, a prefix, *-tō*, of or derived from vegetables or plants, as *vegeto-alkali*. VEGETABLE KINGDOM, one of the three great divisions of organic nature; plants—the other two being the *mineral* and *animal* kingdoms: see PLANT. VEGETABLE MARROW: see under MARROW 1: GOURD. VEGETABLE TISSUE, the substance of which plants consist. See CELLULAR TISSUE: VASCULAR TISSUE.

VEGLIA, *vĕl'yâ:* mountainous island, 23 m. long, 12 m. wide, in the Gulf of Quarnero, inlet of the Adriatic. It belongs to the govt. of Trieste, in the Austrian empire. The products are salt, marble, timber, wine, silk. There is one town, Veglia.—Pop. of island, about 16,000.

VEHEMENT, a. *vē'ĕ-mĕnt* [F. *véhément*—from L. *ve'he mens* and *vehemen'tem*, violent, impetuous—from *ve*, a negative particle, *mens* or *mentem*, mind = not very reasonable: It. *veemente*]: violent; very violent or forcible; very eager; very urgent; ardent; marked by great animation. VE'HEMENTLY, ad. *-lĭ.* VE'HEMENCE, n. *-mĕns*, or VE'HEMEN'CY, n. *-mĕn'sĭ*, great force; violent ardor; animated fervor; fury.

VEHICLE, n. *vē'ĭ-kl* [F. *véhicule*—from L. *vehicŭlum*, a carriage, a wagon—from *veho*, I carry or convey: It. *veiculo*]: any kind of carriage or conveyance; that which is used as the instr. of conveyance or communication; a medium; a solvent, in which varnish, paints, etc., are prepared for use; in *med.*, a substance in which medicine is taken. VE'HICLED, a. *-ĭ-kld*, conveyed in a vehicle. VEHICULAR, a. *vē-hĭk'ū-lĕr*, of or pertaining to a vehicle; also VEHIC'ULARY, a. *-lĕr-i*, and VEHIC'ULATORY, a. *-lă-tĕr-ĭ.* VEHIC'ULATE, v. *-lāt*, to convey, communicate, etc., as by a vehicle or medium.

VEHM'GERICHTE—VEHMIC COURTS: see FEMGERICHTE.

VEII, *vē'ĭ-ī:* ancient city of Etruria. Its site has been a matter of dispute, but it is now generally thought to be at *Isola Farnese*, about 12 m. from Rome. In very early times it was for more than 60 years a formidable rival of Rome—the struggle between the two cities having begun, it is said, as early as the time of Romulus, and continued under each of the kings, except the pacific Numa, down to its fall B.C. 396, after a siege of 10 years. It was forbidden to be again inhabited. In later times a colony was planted there by Cæsar, and again by Augustus; but it always remained an insignificant place. See ETRURIA.

VEIL, n. *vāl* [OF. *veile*, a veil—from L. *vēlum*, a covering, a curtain: It. *velo*, a veil]: a thin transparent cloth used by women to shade or conceal the face; that which is used for intercepting the view and hiding something; a curtain: V. to conceal; to cover; to hide. VEIL'ING, imp. VEILED, pp. *vāld.* TO TAKE THE VEIL, to enter a nunnery or cloister and become a nun, signified by covering the head with the head-dress of a nun.—The *Veil* is a very ancient article of dress. There is an allusion in Ovid to the wearing of veils by the Chinese, and Juvenal speaks of women as being so delicate as to be overheated by a silken veil. Though veils were generally considered portions of female dress, we read in the works of Ambrose, A.D. 374, of 'silken garments and veils interwoven with gold, with which the body of the rich man is encompassed.' Its use is now almost exclusively confined to women.

VEILED PROPH'ET, THE: see MOHAMMEDAN SECTS.

VEIN, n. *vān* [F. *veine*, a vein—from L. *vēna*, a blood-vessel: It. *vena*]: one of the vessels of the body which convey the blood back to the heart; in *bot.*, one of the small branching ribs of a leaf; in *geol.* or *mining*, fissures or rents traversing and ramifying through the solid rock of the earth's crust, filled with mineral or metallic matter, differing from the rock mass in which it occurs; a streak or wave of a different color in marble, wood, etc.; tendency or turn of mind; humor; particular temper, as 'I'm not in the *vein*': V. to produce the appearance of veins in; to grain. VEIN'ING, imp.: N. the giving the appearance of veins to; a streaked appearance as if from the presence of veins. VEINED, pp. *vānd*: ADJ. streaked or marked, as some marbles, with lines or veins of color; having vessels branching over the surface, as a leaf. VEIN'LESS, a. *-lĕs*, having no veins. VEIN'LET, n. *-lĕt*, a small or auxiliary vein. VEIN'OUS, a. *-ŭs*, same as *venous*. VEIN'Y, a. *-ĭ*, full of or abounding in veins. VEINSTONE, the mineral matter found in a vein, in contradistinction to the metallic or metalliferous ores of which it forms the matrix; gangue. VEIN-STUFF, the rock-matter which fills a vein, and through which the ore is disseminated in various forms.

VEINS, in Anatomy: the set of vessels which carry the return flow of blood from the various tissues and organs of the body to the heart or physiological center; or, if we except the pulmonary, the portal, and the umbilical veins, the vessels which carry back venous blood from the capillaries, and, enlarging as they proceed, finally pour it through the ascending and descending *venæ cavæ* into the right auricle of the heart (see CIRCULATION). The coats of the veins are similar to those of the arteries, but much thinner. They are, however, of considerable strength. The *internal coat* consists of an epithelial layer, supported on several laminæ of longitudinal elastic fibres. The *middle* or *contractile coat* consists of numerous alternating layers of muscular and elastic fibres, the muscular fibres being disposed circularly round the vessel. The muscular fibres are absent in some parts of the venous system, and specially developed in others (e.g., in the splenic and portal veins). In the *venæ cavæ* and the pulmonary veins near the heart, striped muscular fibres may be detected, continuous with those in the auricles. The *external fibrous coat* consists of connective tissue and of longitudinal elastic fibres; within some of the larger veins, as the inferior *vena cava* through its whole length, the external iliacs, the azygos, etc., there is also a longitudinal network of unstriped muscular fibres. The veins contain a great number of valves, formed by a doubling of their lining membrane, which give free passage toward the heart, but prevent reflux of the blood: these valves are most numerous in the veins of the extremities, especially the lower ones, these vessels having to act against the force of gravity more than most others. They

are absent in the *venæ cavæ*, the hepatic, portal, renal, pulmonary, and some other large veins, and in very small veins generally. Like the arteries, the veins are nourished by nutrient vessels, or *vasa vasorum;* but except in a few instances (including the inferior *vena cava*), nerves are not distributed to them.

For the chief diseases of the venous system, see PHLEBITIS; PHLEBOLITE; PHLEGMASIA DOLENS, or MILK-LEG; THROMBUS; VARICOSE VEINS.

VEINS, in Geology: crevices, more or less vertical, caused by the contraction during drying or metamorphoses, or by the mechanical disturbance of a rock, and which have been filled by materials different from the body of the rock, or with material drawn in solution from the adjacent rock, as most often occurs. Veins containing substances that have been injected in a state of fusion from heat, or in a pasty condition, have had their origin in some internal force; while those filled with mineral deposits may or may not be connected with upheaval. Granitic and trappean veins differ from dikes chiefly in the greater size of the latter. They produce similar changes in the rocks which they penetrate, indurating clays and sandstones, and converting limestones into marble, or giving them a compact texture like hornstone. Granite veins (when due to pasty material forced up from underlying strata) are generally more sinuous in their course than those of trap; but when the granitic filling is drawn into the fissure from adjacent rock, usually gneiss, the vein may have the regularity of the rupture. One set of veins often intersects another, having been produced at a later period; and the two sets generally differ in color, grain, and even mineral composition. Mineral veins may be filled with different kinds of crystalline minerals, and often in what is called a banded or combed arrangement, the several mineral deposits repeated inversely on the two sides, owing to the minerals successively in solution while the filling was in progress. Quartz and calcite are the most common of these substances; but frequently several different minerals occur in the same vein, some of these being metallic ores. Veins of the same age are filled with the same metals, and usually maintain a general parallelism of direction: thus, the tin and copper veins of Cornwall run nearly e. and w.; while the lead veins run n. and s. Gash veins are due to the shrinkage of the rock, usually limestone, and are confined to the bed in which they occur. Fissure veins may pass through many beds of rock, and they result from deep rending, often extending over a wide area. Other so-called veins began in cavities or cracks enlarged by dissolution of the rock. Still others, spoken of in common language as veins, are more or less upturned sedimentary strata. The filling of veins may be from material segregated from the adjoining rock, or deposits left by water from above, or injections or subli-

mations from below. Three kinds of veins are distinguished by miners—Rake, Pipe, and Flat veins. The rake veins are simple crevices, crossing all the rocks of a series, generally highly inclined, and apparently formed from the contraction of the rock. The two originally opposite surfaces may retain their relative positions, only separated by the interposed contents of the veins; or a fault may place the originally contiguous surfaces at different levels; and in such a case the intervening space between the walls of the vein is irregular, sometimes narrowing so that the walls are in contact, and then widening out, and forming large cavities containing ores. The pipe veins are irregular cavities, filled with minerals, and without any apparent connection with faults in the strata. Flat veins have a general direction corresponding with that of the stratification, and are connected sometimes with rake veins, sometimes with pipe veins. For the manner of working the minerals contained in veins, see MINING.

VEIT, PHILIPP: German painter: b. Berlin, 1793; d. Mayence, 1877. He was grandson of Moses Mendelssohn and stepson of Friedrich Schlegel, and after studying art in Dresden he went to Rome, where he became a member of the circle of the Nazarenes—German Pre-Raphaelites of a religious, romantic and mediæval tendency in art, of which Cornelius and Overbeck were the chief representatives. There he produced the *Seven Years of Plenty,* the *Triumph of Religion,* the frescoes illustrating the *Divine Comedy* in the Villa Massini; and the altar-piece *Queen of Heaven* in the Trinità de' Monti. From 1830-43 he was director of the Städel Institut at Frankfort. Some of his large frescoes in churches won him great reputation. He published *Zehn Vorträge über Kunst* (1871).

VELA, VINCENZO: Italian sculptor: b. Ligornetto, Tessin, 1822; d. there, 1891, Oct. 3. He was stonemason's apprentice at the building of the bridge of Viggio, and after studying under the sculptor Cacciatori in Milan went to Rome (1870) and began the model for a statue of Spartacus, now in a private collection at Saint Petersburg. He later on took up his residence at Turin, where he executed a series of works comprising a wide range of ideal and monumental subjects. His principal works are: *Hope and Resignation,* a statue for the tomb of the Donizetti family in Bergamo; a statue of *Grief* for the tomb of the Ciani family in Lugano; *William Tell,* a fountain statue for the same place; a standing figure of A. Rosmini in Stresa; the kneeling figures of the queen of Sardinia, Maria Theresa (1855), and that of Maria Adelaide in Turin (1861); the statue of the Minister Balbi; the *Dying Napoleon; Columbus and America;* etc.

VELAS'CO: Texas; town in Brazoria co., on the Brazos river, and on the Velasco Terminal railroad; about 5 m. from the mouth of the river and 35 m. s.w. of Galveston. It was laid out in 1891. It had its origin in the needs

VELAZQUEZ.

of the workers who were engaged in securing deep-water, by jetty-work, on that part of the coast, and finally this locality was selected as the shipping-point. The work was done by a private corporation and over $1,500,000 were expended. Now large vessels load and unload at the Velasco wharves. The chief industrial establishments are ice factory, planing mill, and a machine shop. It has a grain elevator, coal and brick yards. There are extensive shipments of cotton and cotton products, grain, fruit, and coal. The town has one bank, with a capital of $50,000. Pop. (not reported separately in 1900); (1910) est. 2,400.

VELASQUEZ, Diego de: Spanish soldier, conqueror of Cuba: b. Cuéllar, Segovia, 1465 (or 1458); d. Havana, 1522 (or 1523). After having fought in the conquest of Granada, he went to Española with Columbus in 1493, and was there prominent in warfare with the Indians. He was appointed by Diego Columbus in 1511 to effect the conquest of Cuba. With a force of 300 he landed in Cuba toward the close of the year, and encountered little resistance except from the cacique Hatney, who was captured and killed. He assumed independence of Diego Columbus, and directed the active campaigning through his subordinate, Panfilo de Narvaez, who had arrived with reinforcements. The island was easily conquered and the natives enslaved. Velasquez made Santiago de Cuba his capital, and founded Trinidad, Matanzas and other settlements. He was connected in 1517 with the expedition of Cordova, which, seeking slaves in the Bahamas, accidentally discovered Yucatan. He also fitted out the expedition of Cortes for the conquest of the Aztecs, and when Cortes asserted independence sent Narvaez to take him prisoner (1520). Cortes defeated Narvaez, and Velasquez obtained no benefit from the conquest of Mexico.

VELAZQUEZ, *vā-lâth'kĕth* (or Velasquez, *vā-lâs'-kĕth*), Diego Rodriguez de Silva: famous Spanish painter: 1599, June 6—1660, Aug. 6; b. Seville; son of Rodriguez de Silva, a lawyer; descended from a noble family of Portuguese origin. His mother's name was Velazquez, and by that he was known. He was sent to be educated in the studio of Francisco Herrera el Viejo, an artist of considerable force and originality. He afterward became the pupil of Francisco Pacheco, a man accomplished in theory, but who could teach him little that was practical. The old pedant had, however, an attractive daughter, Juana, who, doubtless, to the eyes of the young painter, atoned for her parent's deficiencies, and who married him at the end of five years. His chief education, however, as with all men of real genius, was that which he gave himself; he painted assiduously from the life; his models were mostly of the sordid peasant class; and the influence of these seems traceable in some lack of that elevation of ideals needed to ennoble his

superb realistic hardihood of manner. In 1622 he visited Madrid, to study its artistic treasures. During his stay he painted the portrait of the poet Gongora, and made some influential friends, at whose instance he was, 1623, invited to return by Duque de Olivarez, favorite of Philip IV. His portrait of this magnate so delighted the king that he himself sat to the artist; and the result was a picture of great merit, which made Velazquez famous. The office of court painter was bestowed on him, and he embarked on a full tide of prosperity which continued through life. Of Philip IV. and his family he painted many pictures, and a portrait—unfortunately lost—of Charles I. of England, then (1623) at Madrid. The year 1628 was made memorable to him by the arrival, in Madrid, of the great Rubens, on a diplomatic mission. The two artists soon became friends; but though Rubens, during his stay, was assiduous in the practice of his art, Velazquez's style, now matured, was entirely uninfluenced by his florid harmonies of color and riot of animal vigor.

Velazquez had long desired to visit Italy; and permission was granted him 1629. Everywhere he was received with highest honors: in Rome, Pope Urban VIII. assigned him apartments in the Vatican. Here he employed himself chiefly in copying the frescoes of Raphael and Michael Angelo; and it is remarkable that in his one or two original pictures of this time there is no trace of his having been influenced by his studies of these mighty masters. He was not insensible of their power; though he has left it on record that of all the Italians he considered Titian the greatest. Having recovered from a severe illness, he proceeded to Naples; and finally, in the spring of 1631, returned to a cordial welcome at Madrid. He had a painting-room in the palace; and the king was wont to watch him at work. It illustrates a noble trait in the man that when, 1643, the Duque de Olivarez, to whom he had been indebted while obscure, incurred disgrace at the hands of Philip, Velazquez braved the royal displeasure by continuing to show him in everything the accustomed respect. In 1648 Velazquez was sent to Italy, to buy pictures and other works of art for the king. He returned to Madrid 1651; after which many of his finest works were painted. In 1656 the cross of Santiago was conferred on him by Philip—an honor never before awarded except to the highest nobility; also, he was appointed Aposentador Mayor. This high office, whose duties consisted in attendance on the king for superintendence of the quarters occupied by the court at home or on journeys, was one of much honor and emolument; but it involved at times great trouble and anxiety; and on the specially important occasion of the conferences, 1660, to arrange the marriage between Louis XIV. and the Infanta, these were such as utterly to prostrate the painter. July 31 of that year he returned to Madrid, worn out with overwork, and died a week later. He was buried with much ceremonial in the Church of San Juan.

His wife, who was passionately attached to him, survived his loss about a fortnight.

Velazquez—with the exception, perhaps, of Murillo—takes admitted rank as the greatest of Spanish painters. His portraits are, for force, penetration, directness, and severity of truth, of almost unrivalled merit; his historical pictures also are of rare value; his landscape-effects are full of air and light; and his treatment of religious subjects lacks only that deeper spirituality whose expression has been in its fulness attained by none except a few of the earlier Italians. Velazquez did not form a school in art: his style was too individual, his genius too original. His works in Britain and the United States are few: an adequate conception of his style can be formed only at Madrid. See Sir W. Stirling-Maxwell's *Velazquez and His Works* (1855); Stowe's *Velazquez* (1880).

VELD, n. *fĕlt*, or VELDT [Dut. *veld*, a field]: in *s. Africa*, the unforested or sparsely forested region; the grass-country. BUSHVELD, thorns or lowlands; low-wooded lands. HIGHVELD, plains above the altitude of thorns. LOWVELD, n. *lû-fĕlt'*, thornveld; the level where thorns grow, below the great plateau. THORNVELD, n. *lowveld*.

VELEZ-MALAGA, *vā'lĕth-mâ'lâ-gâ:* town of s. Spain, in the mod. prov. of Malaga; 15 m. e.n.e. of the city of Malaga, and less than 2 m. from the shore of the Mediterranean. It stands at the foot of a hill which forms part of the s. range of the Sierra Tejada. The climate is delightful; and owing to the abundance of moisture supplied by the hill streams from the n., and the heat of an almost tropical sun, the vegetation is luxuriant. The aloe, palm, sugar-cane, prickly pear, orange, vine, olive, indigo, and sweet potato (*Batata de Malaga*), grow here abundantly. There are here the ruins of a Moorish castle, with a small tower. The town was taken from the Moors by Ferdinand the Catholic 1487, after a long siege. Pop. about 25,000.

VELI'NO, CATARACT OF. See TERNI.

VELLEIA, *vĕl-lā'yâ*, or VELEIA, *vā-lā'yâ:* town of ancient Liguria, on the n. slope of the Apennines, 18 m. s.-by-e. of Placentia (Piacenza). Little information respecting it can be gleaned from the Latin writers. The Veleiates are mentioned by Pliny among the Ligurian tribes, and seem to have been subjected to Rome B.C. 158. The town, however, dates from the time of Tiberius, and appears, from the traditionary account, to have been overwhelmed by a land-slip of the mountains Moria and Rovinazzo, the earth having been loosened by percolation through it of the waters from a lake high up in the mountains. A comparison of the soil which covers the city with that of the mountains confirms this story. Velleia remained hid and forgotten till 1747, except that for about a century it had been known to a very few that ancient treasures were buried here, and gold statues

and coins had been found. In 1747 a field-laborer turned up a tablet of bronze, on which Trajan's alimentary law for the public maintenance of 279 children was written. This tablet, which measured about 8 feet 8 inches by 5 feet 9 inches, Paris measurement, and weighed 7,200 ounces, narrowly escaped being melted down for bell-metal. Excavations begun 1760 by order of the Duke of Parma, and continued till 1765, resulted in discovery of a forum, in which was another but smaller bronze tablet, an amphitheatre, baths, 12 marble statues, numerous small bronze statues, medals, coins, stamps, inscriptions, and bronze instruments. None of the coins found bear later date than the time of Probus, 276-282; hence it has been supposed that the catastrophe which overwhelmed the city happened during or soon after his reign. The museum at Parma contains most of the antiquities from Velleia.—See *La Rovina di Veleia, misurate e disegnate da Giovanni Antolini*, etc. (Milano, 1819); and *Tavola Legislativa della Gallia Cisalpina ritrovata in Veleia, da D. Pietro di Lama* (Parma, 1820).

VELLET, n. *vĕl'lĕt* [see VELVET]: in *OE.*, velvet; also VEL'LUTE, n. *-lūt*.

VELLETRI, *vĕl-lā'trē:* city of s. Italy, province of Rome, 21 m. s.e. of Rome; on a hill, a spur of Monte Artemisio. The city is walled and well-built. The principal buildings are the cathedral, an ancient Gothic structure; and the Ginetti Palace, with a marble staircase, considered the finest in Italy. The hill of Velletri, which, like the surface of all the country between it and Rome, shows evidence of volcanic action, produces good wines. Pop. 20,000.

VELLON': Spanish for BILLON (q.v.).

VELLORE, *vĕl-lōr':* town and fortress of British India, 79 m. w. of Madras, on the right bank of the Palar. The fort is extensive, is surrounded by a ditch cut in the solid rock, and contains barracks, hospitals, etc. The town is large, clean, and airy, and has an extensive and well-supplied bazaar. There is a remarkable and splendid pagoda, dedicated to Krishna, whose adventures with the *gopis*, or milkmaids, are represented in a series of elaborate sculptures. Although the heat of Vellore is great, it is considered one of the most healthful stations in the Carnatic. Pop. 42,000.

VELLOZIA, *vĕl-lō'zĭ-a:* genus of plants, of nat. order *Hæmodoraceæ*, natives of Brazil, s. Guiana, and the Mascarene Islands; sometimes called *Tree Lilies*. They are perennials, with trunks closely covered by the withered remains of leaves, branching by forks, and bearing tufts of long, narrow, aloe-like leaves at the extremities of the branches. Some are from 2 to 10 ft. high, and the trunk is sometimes as thick as a man's body. The structure of the trunk is very remarkable: it has a slender sub-cylindrical central column, of the ordinary monocotyledonous

structure, outside of which are arranged great quantities of slender fibrous roots, which cohere firmly by their own cellular surface, and form a spurious kind of wood. In some s. districts of Brazil, vellozias are found covering large tracts. The flowers of the larger species are about six inches long, either pure white, or of beautiful purple color, and resembling the white lily of our gardens.

VELLUM, n. *vĕl'lŭm* [F. *vélin*, vellum—from L. *vitŭlīnus*, of or pertaining to a calf—from *vitŭlus*, a calf]: a fine kind of parchment prepared from the skins of calves, kids, and lambs, and used for writing on (see PARCHMENT). VEL'LUMY, a. having a surface resembling that of vellum.

VELLUS, n. *vĕl'lŭs* [L. *vellus*, a fleece]: in *bot.*, the stipe of some fungi.

VELOCIPEDE, n. *vĕ-lŏs'ĭ-pēd* [F. *vélocipède*, a velocipede—from L. *velox* or *velōcem*, swift; *pes* or *pedem*, a foot]: a light carriage with two (or three) wheels, propelled by the rider by means of a treadle; with two wheels it is called a BICYCLE, *bī'sĭk-l* [L. *bis*, twice; Gr. *kuklos*, a circle], and with three wheels a TRICYCLE, *trī'-sĭ-kl* [L. *tres*, three]: see BICYCLE; TRICYCLE. VELOC'IPE'DIST, n. *-lŏs'ĭ-pē'dĭst*, one who rides on a velocipede.

VELOCITY, n. *vĕ-lŏs'ĭ-tĭ* [F. *vélocité*—from L. *velocitas* or *velocĭtātem*, speed—from *velox* or *velōcem*, swift: It. *velocità*]: quickness of motion; rapidity; rate of motion (see below).—SYN.: quickness; celerity; expedition; swiftness; fleetness; speed.

VELOC'ITY: speed, or *rate of motion*. For its proper measurement, we must distinguish between uniform and varying velocity.

Uniform velocity is easily measured by *the space passed over in a unit of time:* thus, we speak of velocities of 10 ft. per second, 20 m. per hour, etc. But, for scientific purposes, it is best to keep, as far as possible, to definite units of time and space; and those most generally convenient are the *second* and the *foot*. The *foot* is definitely known; the *second* is usually chosen as the interval between the beats of a good mean-time clock. Unfortunately, its duration is not invariable; but, as ages must elapse before any sensible alteration takes place in its length, it may be used without inconvenience. If, then, v be the velocity of a point moving uniformly, we mean that v feet are passed over in each second; so that if s represent the space passed over in t seconds, we have

$$s = vt,$$

a formula which contains all the properties of uniform motion. It gives

$$v = \frac{s}{t};$$

i.e., to find the velocity of a moving point (when uniform), divide the space (in ft.) described in *any* period of time by the number of seconds in the period. This

will give the same result whether we take a million seconds or the millionth part of a second, as the period in question. This at once shows us how to proceed in measuring a variable velocity, such as that of a stone let fall, in which case the velocity constantly increases, or of a stone thrown upward, in which case the velocity constantly diminishes.

That a moving body has, at every instant, however irregular its motion may be, a definite velocity, is obvious. Thus, when traveling in a railroad train, we say, shortly after starting: 'We are now going at the rate of a mile an hour'; not thereby meaning that it will take us an hour to complete the mile, but that, *if we were to go on for an hour at our present rate of velocity, we should run a mile.* In common language, then, our question is, how to measure our present rate.

If we could at any instant so adjust the steam-power to the resistance of the air and the friction of the rails as to keep the rate unaltered, we should have uniform velocity, measurable with ease. But, as we cannot generally do this (though Attwood's machine enables us to do it in the case of a falling body), we are driven to some other expedient. Now, it is obvious that the smaller the interval that we take, the less will our velocity have changed during its lapse, i.e., the more nearly will it have become uniform and measurable by the simple formula given above. That is, for a variable velocity we have

$$v=\frac{s}{t}$$

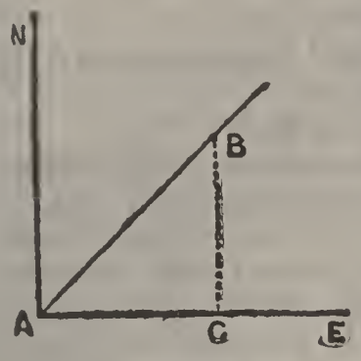
as an approximation, which is more and more nearly true as t, and therefore s is smaller. In the language of the differential calculus—whose fundamental notions, as laid down by its great inventor, were derived from this very question, the velocity being simply the *Fluxion* (q.v.) of the space described—we have

$$v=\frac{ds}{dt}.$$

Practically, by means of the electric chronoscope, we can now measure (very exactly) extremely small intervals of time, e.g., the interval between the fall of the dog-head and the exit of the bullet from a rifle-barrel; so that a variable velocity now presents no formidable difficulty, as we can study and measure it *while it is almost absolutely uniform.*

We define *average* velocity as the space described in any time divided by the number of seconds employed. This may not, except at one or more instants during the motion, represent the actual velocity; but it is a velocity with which, if uniform, the same space would have been described in the same time. We shall presently have an opportunity of usefully applying this definition to one interesting case of varying velocity.

The *resolution* and *composition* of simultaneous velocities follow, almost intuitively, from the most elementary



geometrical notions. When a man is walking n.e. at uniform rate, it is obvious that he is advancing northward, and also eastward. What is his northward, and what his eastward velocity? The answer is simple. Suppose that in one second he walks from A to B, then AB represents his whole velocity. But draw AN northward, and AE eastward; also draw BC parallel to AN. Then AC is the space by which B is eastward of A, BC the space by which it is northward. Hence AC represents the eastward, and CB the northward velocity (each being the space in its respective direction described in one second), and these are called *components* of the velocity AB. AB, again, is said to be *resolved* into AC and CB.

The general proposition is this, that a velocity represented by one side of a triangle may be resolved into two, represented in magnitude and direction by the other sides of the triangle. One or both of these may be again resolved by a similar process; and we find, as the most general propositions on the subject, that velocities represented by all the sides of a polygon (whether in one plane or not) but one, taken in the same order round, are jointly equivalent to a velocity represented by that one side, taken in the *opposite* order; also that a point which has, simultaneously, velocities represented by the successive sides of any polygon, taken all in the same order round, *is at rest*. The second law of motion (see MOTION, LAWS OF) enables us to interpret this geometrical theorem into the Physical Truths known as the Triangle and Polygon Forces in Statics.

Rate of change of velocity is called *Acceleration:* it is measured in the same way as velocity itself. Thus, if the changes take place in the direction of motion, it affects merely the amount, not the direction, of the velocity; and an acceleration a adds (or subtracts if it be negative) a feet per second from the velocity affected. Thus it is found that gravity produces an acceleration of about 32.2 on all falling bodies; so that if a stone be let fall, its velocity after t seconds is $32.2t$. If it be *thrown* down with a velocity v, its velocity in t seconds is $v + 32.2t$. If thrown upward with the same velocity, in t seconds its velocity becomes $v - 32.2t$, so that it will stop and begin to descend after $\frac{v}{32.2}$ seconds have elapsed.

The space passed over by the stone in t seconds is easily calculated by the help of the *average* velocity. For, since in any of the above cases the velocity increases (or diminishes) *uniformly*, its average value during any interval is the average of its values at the beginning and end of the interval. Hence, for the stone simply let fall:

Initial velocity $= 0$,

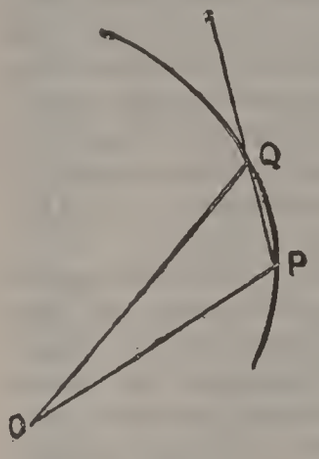
Velocity after t seconds $= 32.2t$.

Average velocity during the first t seconds $= 16.1t$, hence, space described in t seconds

$= t \times$ average velocity $= 16.1t^2$.

Thus the spaces described are as the *squares* of the times.

But, if the acceleration be not in the direction of motion, the direction and magnitude of the velocity will generally change. To exhibit this geometrically, Sir W. Rowan Hamilton (q.v.) invented the following beautiful construction of what he called the Hodograph of the motion. Let O be any fixed point, and from it draw lines OP, OQ, etc., representing, at every instant, in direction and magnitude, the velocity of the moving point. The extremities of such lines will form a curve, such as PQ in the figure. If OP and OQ be any two of these, the *change* of velocity is represented (as above) by the third side, PQ, of the triangle. As Q is taken nearer and nearer to P, PQ becomes more and more nearly the tangent to the hodograph, so that the tangent at P has the *direction* of the acceleration, and the rate at which P moves round the hodograph is the *magnitude* of the acceleration.



If we consider any uniform motion, we see that the hodograph is a circle (its radius being the magnitude of the velocity), and from this it is easy to see that *in uniform motion the acceleration is always perpendicular to the direction of motion.* If we consider uniform motion, with velocity V, in a circle of radius R, the hodograph at once shows that the acceleration is $\frac{V^2}{R}$, and is directed toward the center of the circle.

Translated into Physics, acceleration (multiplied by the mass of the moving body) is the measure of the force which acts on the body. So the above simple example shows that, to keep a mass moving uniformly in a circle, it must be drawn toward the center by a force proportional directly to the square of the velocity, and inversely to the radius. This is the physical explanation of the so-called Centrifugal Force (see CENTRAL FORCES).

VELOCITY, INITIAL, in Gunnery: speed with which the ball leaves the muzzle of a gun when fired. This was formerly calculated from the momentum as shown by the Ballistic Pendulum; but better results have been obtained from the use of the Electro-ballistic Pendulum, of Major Navez of the Belgian service, which actually measures the interval of time during which the shot traverses a short space. The apparatus consists of a steel pendulum falling at the side of a graduated sector of a circle. Be-

hind the segment is a piece of iron capable of being magnetized by a galvanic battery adjoining. The wires for completing the circuit between the battery and the magnet are so arranged that they are in connection with two targets of paper or other thin material in the line of the projectile's fire. So long as the circuit is complete, and before the experiment, the magnet holds the pendulum at its highest point. When the shot pierces the first target, the circuit is broken, the iron demagnetized, and the pendulum released; these effects being absolutely simultaneous. With equal simultaneity, the piercing the second target re-establishes the circuit, magnetizes the iron, and arrests the pendulum in its descent. The distance between the targets is known, and the accumulating resistance of the atmosphere within that time; the sector being finely graduated, the distance traversed by the pendulum shows exactly the fraction of a second occupied, and from these data the initial velocity is a matter of simple computation. Of smooth-bore cannon, the initial velocity is about 1,600 ft. per second; of the great breech-loading rifle, more than 2,000 ft. per second.

VELOCITY OF ELECTRICITY: the rate at which electricity is propagated through a conductor. The velocity of electricity through a conducting wire is in all cases very great when compared with the velocities of moving bodies, such as the velocity of a railway train or of a projectile; but the velocity of electricity, any more than the velocity of a planet, of a railway train, or of a bullet, is not a certain number of miles per second fixed for all cases; it varies for a number of causes, and to such an extent that while Wheatstone found the velocity through copper wire to be 288,000 miles per second, in the Atlantic cable of 1858 it was found to be 3,000 miles per second. Faraday showed that a submarine cable acts precisely as a leyden-jar, that the water serves as the outside coating, and that just as a leyden-jar takes time to become charged and to discharge, so a cable through which a sharp signal is sent from one end delivers the signal at the other end more or less prolonged; that is, the deflection of the receiving needle is gradual, reaching a maximum and then at the same rate coming back to rest. Sir William Thomson showed that the more delicate the receiving instrument, the more instantaneous is the first appearance of the current at the receiving end of the cable. He gives three reasons for the retardation of the electric current: (1) Charge and electrical accumulation in a conductor subjected in any way to the process of electrification. (2) Electromagnetic induction, or electromotive force, excited in a conductor by variations of electric currents either in adjacent conductors or in different parts of its own length. (3) Resistance to conduction through a solid. The first successful attempt to find the velocity of electricity was made by Wheatstone with the revolving mirror (his invention), which has been

so successfully employed by Foucault to discover the velocity of light.

VELOCITY OF LIGHT: the rate at which light is propagated. There have been two astronomical estimates of the velocity of light and two terrestrial estimates. The satellites of Jupiter revolve regularly round the planet. When the earth is in such a position with respect to Jupiter that there is the distance of the breadth of the earth's orbit in addition to the distance of Jupiter's orbit from the earth's orbit between Jupiter and the earth (when Jupiter is in opposition), there is an irregularity of 16 minutes 26.6 seconds in the times at which they are hidden by the planet as compared with corresponding occultations when the earth is the breadth of its orbit nearer Jupiter (when the earth is in conjunction). Thus it takes light 16 minutes 26.6 seconds to pass across the earth's orbit. Taking this distance as 183,000,000 miles, the velocity thus found is 185,500 miles per second nearly. The second astronomical estimate has been made by means of what is called the aberration of the fixed stars. Each star appears to describe a small orbit in the course of a year about its true place. The motion of the earth in its orbit carries the spectator at one time so as to increase the relative velocity of the light from the star, and at another so as to diminish this velocity. In this way it has been computed that the velocity of light is about 10,000 times the velocity of the earth in its orbit, that is, about 185,000 miles per second. Roemer, a Danish astronomer, invented the first of these methods, and Bradley, an English astronomer, invented the second. The two experimental estimates were made, the first by Fizeau, and the second by Foucault. See also LIGHT.

VELOC'ITY, VIRTUAL. See WORK.

VELOURS, n. *vė-lôr* [F., velvet]: fabric for upholstering, etc.; a velvet or plush, partly of linen and partly of double cotton warps, with mohair-yarn weft.

VELOXITE: a smokeless explosive powder invented by William Hope in 1903. It contains no nitro compound, sulphur, phosphorus, chlorate, in fact no dangerous ingredients. The flashing point of black powder is at 640 degrees Fahrenheit, that of cordite and all nitro powders is only from 360 to 370 degrees, while that of veloxite is about 12,000. Veloxite stands the hammering of a sledge hammer on an anvil. The ingredients are stable and therefore the powder is stable. The setting up of chemical action is impossible in any length of time and in any variations of climatic conditions. Veloxite can be made in the morning and fired in the afternoon, not requiring, as other powders do, several weeks to manufacture. It can be made cheaply, its ingredients can be purchased in unlimited quantities by the ton and it is available for small arms as well as artillery.

VELPEAU, *vĕl-pō'*, ALFRED ARMAND LOUIS MARIE: surgeon: 1795, May 18—1867, Aug. 24; b. Brèche, France.

His father was a horse-doctor, and Velpeau early was interested in medicine. He began the study of medicine in Tours 1816, settled in Paris 1821, became surgeon at la Pitié 1830, professor of clinical surgery in the Academy of Medicine 1835, and at the Institute 1842. He ranks among the foremost surgeons of modern times. His published works are numerous; his *Leçons Orales de Clinique Chirurgicale* were published 1840-1 by two of his pupils.

VELUM, n. *vē'lŭm* [L. *vēlum,* a covering, a veil]: in *bot.,* the cellular covering of the gills of an agaric in its early state; in *zool.,* the membranous ledge which surrounds the mouth of the disk of the Medusæ.

VELURE, n. *vĕl'ūr* [F. *velours;* OF. *velous,* velvet—from L. *villōsus, hairy* (see VELVET)]: in *OE.,* velvet.

VELUTINOUS, a. *vĕl-ū'tĭ-nŭs* [a manufactured word (see VELVET)]: in *bot.,* having a velvety appearance; feeling like velvet.

VELVET, n. *vĕl'vĕt* [OE. *velwet, velouet, vellet*—from O. It. *veluto;* It. *velluto,* velvet—from L. *villus,* shaggy hair, allied to *vellus,* a fleece]: a rich closely-woven silk stuff having on one side a fine soft pile; a similar fabric made of cotton, also called velveteen; the fine down on the horns of a deer during their early development: ADJ. made of velvet; soft; delicate. VEL'VETY, a. *-ĭ,* resembling velvet; soft, smooth, or delicate. VEL'VETING, n. velvet goods; the soft pile of velvet. VEL'VETEEN', n. *-ēn',* a stuff made of twilled cotton in imitation of velvet. VELVERET, n. *vĕl-vĕr-ĕt',* an inferior sort of velvet having the pile of silk and the web of cotton. VELVET-GUARDS, in *OE.,* velvet trimmings; hence, the citizens who wore them.—*Velvet* is properly a silk fabric with thick short pile on one side; but cotton velvets also are made. In velvet-weaving two warps are used—the ordinary 'beam warp,' and a much finer and longer one called the 'pole' or 'pile' warp, which at every third pick or throw of the shuttle is caught in loops on a grooved wire, which is then introduced into the shed, and beaten up into the cloth. The rows of loops thus formed on the surface are afterward cut by running a 'trivet' or cutting-knife along the groove in the wires which are thus released.

VENABLE, WILLIAM HENRY, AM., LL.D.: American author and educator: b. Warren co., Ohio, 1836, Apr. 29. He began to teach at 17, and was professor of natural sciences in the Chickering Institute, Cincinnati, 1862-8; and principal and proprietor of the same 1881-6. He was professor of English literature in the Hughes high school 1889-95, and has held a similar post in the Walnut Hills high school, Cincinnati, since the last named year. Among his numerous works are: *A History of the United States* (1872); *June on the Miami and Other Poems* (1872); *The Teacher's Dream* (1881); *Beginnings of Literary Culture in the Ohio Valley* (1891); *Let Him First be a*

Man (1894); *Dream of Empire, or the House of Blennerhassett* (1901); *Saga of the Oak, and Other Poems* (1904); etc.

VENAL, a. *vē'năl* [F. *vénal*—from L. *venālĭs*, for sale, to be sold—from *vēnus*, sale: It. *venale*]: that may be purchased or bribed; ready to sell one's services, influence, etc., for money, as a *venal* politician; mercenary; hireling; corrupt; made a matter of sordid bargaining, as a *venal* offense. VE'NALLY, ad. *-lĭ*. VENALITY, n. *vē-năl'ĭ-tĭ*, state of being influenced by money or by a bribe; prostitution of talents or services for money or reward.

VENAL, a. *vē'năl* [L. *vēna*, a vein]: venous.

VENA PORTA, n. *vē'nă pōr'tă* [L. *vēna*, a vein; *Porta*, the name of an Italian anatomist]: in *anat.*, the large vein which conveys the blood from the intestines into the liver. VENÆ CAVÆ, n. *vē'nē kăv'ē* [L., the hollow veins]: the large veins which pour the blood collected from the body into the heart. See CIRCULATION.

VENARY, a. *vĕn'ă-rĭ* [L. *venāri*, to hunt, to chase]: in *OE.*, of or pertaining to hunting or the chase.

VENATION, n. *vē-nā'shŭn* [L. *vēna*, a vein]: the arrangement of the veins, as in a leaf, the wings of an insect, or the like.

VEND, v. *vĕnd* [F. *vendre*, to sell—from L. *vendĕrĕ*, to sell, to give up a thing for money—from *vēnum*, sale; *do*, I give: It. *vendere*]: to sell; to give or transfer to another for money, as articles of merchandise. VEND'ING, imp. VEND'ED, pp. VEND'ER, or VEND'OR, n. *-ėr*, a seller. VENDEE, n. *vĕn-dē'*, the person to whom a thing is sold. VEND'IBLE, a. *-ĭ-bl*, salable; that may or can be sold. VEND'IBLY, ad. *-blĭ*. VEND'IBLENESS, n. *-bl-nĕs*, or VEND'IBIL'ITY, n. *-bĭl'-ĭ-tĭ*, state of being salable. VENDITION, n. *vĕn-dĭsh'ŭn*, sale; the act of selling.

VENDACE, n. *vĕn'dās* [F. *vandoise*]: a fish of the family Salmonidæ, *Coregonus Willughbii* (or *marœnula*), found in the rivers and lakes of Sweden, in the Castle Loch at Lochmaben in Scotland, and in some English lakes (see COREGONUS). Like most of its congeners, it is esteemed for the table. Its food consists chiefly of *Entomostraca*, and it is never taken by angling. Sweep-nets are used for its capture. It swims usually in considerable shoals, often with a remarkable separation of the sexes. It attains a length of 6 or 7 inches, is deeper in proportion than many of the Salmonidæ, and of compressed form. The back is brown, sides are tinged with yellow, cheeks partly white, and there is a curious, red, heart-shaped mark between the eyes.

VENDÉE, LA, *lâ vŏng'dā':* maritime dept. in w. France; bounded w. by the Bay of Biscay, n. by the dept. of Loire-Inférieure, e. by Deux-Sèvres, s. by Charente-Inférieure; 2,587 sq.m. The dept., named from a small affluent of the Charente, is traversed from e. to

w. by a range of hills, called in the e. the Plateau de Gatin, and in the w. the Collines Nantaises; and is watered in the n. by affluents of the Loire, and in the s. by the Lay and the affluents of the Charente. The territory of La Vendée is divided into three parts, whose names indicate their configuration. In the w. is the *Marais,* occupied by salt marshes and lakes; in the n. is the *Bocage,* covered with plantations; in the s. and middle is the *Plaine,* an open and fertile tract. The Atlantic coast of 93 m. presents few deep indentations, the chief being the Bay of Aiguillon, which affords secure anchorage. The climate is warm, humid, and unhealthful in the *Marais,* cold and humid in the *Bocage,* and warm, dry, and healthful in the *Plaine.* Cereals, potatoes, and vegetables are largely cultivated; the wine is white and of inferior quality. Among the mineral treasures, iron ore is very abundant. There are three arrondissements—La Rochesur-Yon, Fontenay-le-Comte, and Sables-d'Olonne, cap. La Roche-sur-Yon.—Pop. (1901) 441,311.

For the *wars of La Vandée* (by which name the armed opposition to the religious and political changes in France is denoted, and which burst out into a species of partizan warfare in 1793, 4-5, 1799, and 1815), see CATHELINEAU; LAROCHEJACQUELEIN; HOCHE; CHOUANS; etc.

VENDÉMIAIRE, *vŏng-dā-mĭ-ār'* ['Wine-month']: first month of the French revolutionary calendar, beginning Sept. 22 and ending Oct. 21 (1793): see CALENDAR.

VENDETTA, *vĕn-dĕt'tâ:* blood-feud; the practice of taking private vengeance on those who have shed the blood of a relative—a practice which prevails especially in Corsica, and to a limited extent in Sicily, Sardinia, Calabria, etc., and in some s. and s.w. parts of the United States. In Corsica it is considered a duty incumbent on every one; and should the murderer succeeded in eluding the pursuit of the murdered man's kinsmen, revenge may be taken on the murderer's relatives. Hence, in Corsica, the relatives of a murderer whose crime is unavenged have to live in a state of incessant precaution. When they go to the fields, they take their arms with them, and set a watch; at home, they have their doors well fastened, and their windows barricaded. Instances are on record of persons 'suffering the vendetta' having lived shut up in their houses for 10 or 15 years, and being, after all, shot on the first occasion on which they ventured out of doors. Formerly, when blood had been shed, there was a custom (now disused) of proclaiming a war of revenge, and announcing to what degree of relationship it should extend. The duty of taking vengeance lies primarily on the next of kin. Not to take revenge is deemed in the highest degree dishonorable; and any delay by the next of kin is made matter of reproach by his relatives. The women instigate the men to revenge.

The origin of the Vendetta has often been referred to the lawlessness which prevailed in many parts of Corsica

during the Genoese domination, and to the venality which vitiated the Genoese administration of justice. No doubt this has had something to do with it; but its origin must be sought in more general causes, for it is not exclusively a Corsican custom. A system of private vengeance has existed among almost every people during certain stages of its progress—never entirely passing away until government became strong enough to insure redress of injuries, and to restrain the passions of individuals. The incidents of the Vendetta among rude tribes are usually the same which Sir G. Grey found subsisting among the aborigines of Australia, vividly described in his *Journals of Travel in the Northwest of Australia.*

Of the prevalence of the blood-feud among tribes which have advanced to what is called the patriarchal state also there is ample evidence. Among such tribes the cohesion of the family is very powerful; everything relating to the family is quasi-sacred; and the duty of taking vengeance for kindred blood is a matter not merely of honor, but also of religion. Among the Bedouins it is called *Tar,* or retaliation; and the right of exacting it devolves on the nearest of kin to the man slain; and if the proposed victim perishes from any other cause, then the vengeance is directed against his nearest relative. The Vendetta is observed among the Circassians, the Druses, and the numerous hordes of central Asia; it seems to have had the same incidents, too, among similar tribes in ancient times—e.g., among the Greeks of the Homeric period, among the Germans in the time of Tacitus, among the northern nations who overran Europe after the fall of the Roman empire.

The right of private war which subsisted in Europe in the middle ages—introduced by the northern nations who shared the spoils of the Roman empire—belonged to the nobility only, and could be exercised only against men of equal rank. It was usually resorted to on account of insults publicly done, of atrocious acts of violence or bloodshed, and similar injuries. The right of vengeance devolved first on the next of kin; but all the kindred within the degrees of relationship to which the ecclesiastical prohibitions of marriage extended were bound to take up the quarrel; and this obligation was so far sanctioned by law that if any one failed to fulfil it he was deemed to have renounced his kindredship, and to have lost his rights of succession. Previous to the consolidation of society, this system was a rude substitute for protection by government and for administration of justice. As society became organized, the right of Vendetta was curtailed—remaining longest with the nobility, who at last were compelled to surrender it by the growing power of the state.

VENDÔME, *vōng-dōm′:* town of France, dept. of Loire-et-Cher; on the Loire, which here divides into many canals; 45 m. w.s.w. of Orleans, 109 m. s.w. of Paris. It contains cavalry barracks; a theatre; the Church of

the Trinity, a remarkable edifice (founded 1030); one of the most beautiful colleges of France; and the ruins of a lofty castle. Manufactures of cloths, needles, and embroideries are actively carried on.—Pop. 8,000.

Vendôme, a very anc. town, and said to have been of importance under the Merovingians, was cap. of the anc. county of Vendômois, which was erected into a duchy-peerage by Francis I., in favor of Charles de Bourbon, the grandfather of Henry IV., who conferred it on Cæsar, the eldest of his natural sons, who thus became the founder of the House of Vendôme. In 1870 it was the scene of several conflicts between the French and Germans.

VENDÔME, (Louis Joseph), Duke of: French general, who distinguished himself during the war of the Spanish succession (see Succession Wars): 1654, July 1—1712, June 11; b. Paris; eldest son of Louis, Duke of Vendôme, and Laura Mancini, niece of Mazarin; and great-grandson of Henry IV. Vendôme made his first appearance on the field of battle as a lifeguardsman during the Dutch campaign of 1672, afterward serving with distinction under Turenne in Germany and Alsace, and under Crequi in Flanders. Released by the peace of Nimeguen (1678), he retired to his chateau of Anet, near Dreux, where he resigned himself to indulgence in all kinds of pleasure. At this time he became compromised in the affairs of Lavoisin (see Poisoning); but it turned out that his intercourse with the pretended seer was prompted merely by curiosity. On the outbreak of war in 1688, he was ordered to the Low Countries, where, under Luxembourg (q.v.), he earned renown at the sieges of Mons and Namur, and the battles of Leuse and Steenkerke; and his reputation was not diminished by his subsequent conduct in Italy, where he commanded the left wing of Catinat's army at the battle of Marsaglia, 1693, Oct. 4. But Vendôme's gallantry and brilliant military talents had not hitherto obtained for him an independent command, for it was evident that with these valuable qualities were combined inveterate indolence and careless and disorderly habits, which might bring ruin to any enterprise under his management. However, the necessities of the case induced Louis ultimately to give him (1695) command of the army in Catalonia; and he was agreeably surprised at the alertness of Vendôme, who closed a series of brilliant successes by the capture of Barcelona. After five years of inaction, spent in sloth and sensuality, Vendôme was ordered to Italy to supersede Villeroy. His arrival was hailed enthusiastically. The restored confidence of the troops was proved by the victories of Ustiano and San Vittorio; while the enforced retirement of Prince Eugene beyond the Mincio showed the superior strategic abilities of their general; and it required the utmost exercise of both to prevent the surprise at Luzzara, 1702, Aug. 17 (the result of Ven-

dôme's usual carelessness), from becoming a total rout. From this time a slight though temporary improvement in Vendôme's habits is noticeable. In 1703 he drove the Austrians into the Tyrol, repeatedly defeating Starhemberg. Eugene was advancing to the relief of Turin, when the defeat of his advance-guard by Vendôme compelled a halt. The imprudent Frenchman, however, intrusted to his younger brother the difficult duty of holding Eugene in check; and had not Vendôme returned to Cassano just in time to divide the honors of the battle-field with his opponent, the army of observation would have been scattered. Again, partially stimulated by this narrow escape, Vendôme displayed unwonted vigor, and drove the Austrians into the Trentin; but in the summer of 1706 he was recalled to supersede Villeroy, who had blundered in the Low Countries, as he had formerly blundered in Italy. Unfortunately an attempt was made to counteract Vendôme's besetting faults by uniting the Duke of Burgundy with him in command; and the lack of a thorough understanding between the conjoint chiefs led to the defeat of the French at Oudenarde (q.v.), and to the failure of the attempt to relieve Lille. The cause of these reverses formed the subject of vehement discussions in Franc. Though Vendôme was mostly to blame; his great reputation gained him the public support; but Louis XIV. held him in a sort of disgrace for a time. In 1710 a cry of distress arose from Spain, where the British and Austrians were carrying all before them; and in compliance with the urgent request of Philip V. (who had served under Vendôme in Italy) to his grandfather to send him, not a reinforcement, but only Vendôme, the heroic old debauchee was once more called to active service, and dispatched to Spain. His appearance, like that of Du Guesclin more than three centuries before, brought together, as if by magic, a numerous army of volunteers; towns, villages, and even religious establishments united in enthusiastic contribution of the necessary funds, and Philip was settled in his capital before the close of the year. A week later, Stanhope and the Brit. troops were defeated and captured at Brihuega; and on the following day, Starhemberg and the Austrians were completely routed at Villa Viciosa. The grateful monarch raised his deliverer to the rank of 'prince of the blood-royal,' and presented him with 500,000 livres (about $100,000), a gift which Vendôme accepted only to distribute it among his soldiers. Vendôme for the last time relapsed into his former habits, and, after 'a month of extraordinary gluttony,' died of indigestion at Vinaroz, in Valencia. Of all the descendants of Henry IV., Vendôme bears the strongest resemblance to his great-grandfather; but of his resolute persistency and self-denial he shows no trace.—See Saint-Simon's biography of Vendôme, and Voltaire's *Siècle de Louis XIV.*

VENDOR'S LIEN, *vĕnd'ĕrz lēn:* right of one who sells

land, giving a deed which declares that the purchase-money has been paid (though in fact it has not all been paid), to recover what remains due out of the proceeds of a resale: this lien stands till all the purchase-money is paid. If the vendor takes security, the court will inquire whether the security was taken in lieu of the purchase-money: if it was, the Vendor's Lien does not hold. Vendor's Lien is recognized in many states of the Union; in others it has been abolished by statute, or it is not recognized by the courts.

VENDUE, n. *vĕn-dū'* [OF. *vendue, a* sale (see VEND)]: public auction.

VENEER, v. *vĕ-nēr'* [Ger. *furnieren,* to veneer, to inlay—from F. *fournir,* to furnish (see FURNISH)]: to overlay or plate an inferior wood with a thin layer of fine wood for outer finish or decoration; hence, generally, to make superficially attractive or agreeable; to give a gloss to: N. a thin sheet of a more valuable and ornamental wood for overlaying an inferior kind. Only choice kinds of hard woods are sawn into veneers, and they are usually attached to deal or pine, so as to give the article all the appearance of being made solid. In this way the more costly kinds of furniture-woods are economically used by the cabinet-maker; for, with the improvements in the process of sawing, veneers as thin as paper have been produced. VENEER'ING, imp.: N. the process of decorating ordinary wood-surfaces with thin slices of rare and beautiful woods; the fine wood employed in the overlaying. VENEERED', pp. *-nērd'*.

VENERATE, v. *vĕn'ĕr-āt* [L. *venĕrātus,* pp. of *venĕror,* I reverence—akin to Skr. *wan,* to worship: F. *vénérer,* to venerate]: to regard with the highest degree of respect and reverence; to esteem as sacred; to revere. VEN'ERATING, imp. VEN'ERATED, pp. VEN'ERA'TION, n. *-ā'shŭn,* the highest degree of respect and reverence; respect mingled with some degree of awe. VEN'ERATOR, n. *-ā-tėr,* one who reveres. VEN'ERABLE, a. *-ă-bl* [F. *vénérable*—L.]: worthy of the highest respect; rendered sacred by religious associations or by age; aged; the style of an archdeacon. VEN'ERABLY, ad. *-ă-blĭ.* VEN'ERABLENESS, n. *-ă-bl-nĕs,* the state or quality of being venerable. VEN'ERABIL'ITY, n. *-bĭl'ĭ-tĭ,* in *OE.,* venerableness.—SYN. of 'venerate': to reverence; adorn; worship.

VENEREAL, a. *vĕ-nē'rē-ăl* [L. *venĕrĕus,* of or pertaining to Venus—from *Venus,* the goddess of love]: pertaining to or arising from sexual intercourse. VENE'REOUS, a. *-rē-ŭs,* exciting to sexual intercourse; lecherous. VENERY, n. *vĕn'ĕr-ĭ,* sexual intercourse; the gratification of sexual desire. VENEREAL DISEASE: see SYPHILIS.

VENERIDÆ, *vē-nĕr'ĭ-dē:* family of limellibranchiate mollusks, having a regular, closed, bivalve shell; the teeth and laminæ of the hinge near together in a single group under the beak (*umbo*); generally three diverging teeth

in each valve; a marked oval impression in front of the beak; the general form similar to that of the cockles (*Cardiaceæ*), but usually more flattened. The mantle has a large opening in front; the siphons are unequal, more or less united; the foot is tongue-shaped, compressed, sometimes grooved, and producing a Byssus. The species are very widely distributed, but abound chiefly in tropical seas. The Veneridæ are generally elegant in form, and often finely colored. Some have the shell furnished with long spines, but chevron-shaped lines are their common ornament. The typical genus *Venus*, 176 living species, is of world-wide distribution. The common round clam or quahaug of our coast is the *Venus mercenaria*, so called because the Indians used its shells for making wampum. Other genera of the family are *Cytherea* (113 recent species), *Meroe*, *Trigona*, *Artemis*, the rock-boring *Petricola*, *Tapes*, etc. The Veneridæ appear first in the oolitic rocks, and are more abundant in the present than in any former geological epoch.

VENERY, n. *vĕn'ĕr-ĭ* [F. *vénerie*, hunting—from L. *venāri*, to hunt]: hunting; the chase; in *OE.*, what is hunted.

VENERY. See under VENEREAL.

VENESECTION, n. *vē'nĕ-sĕk'shŭn* [L. *vēna*, a vein; *sectĭō*, *sectĭōnem*, a cutting—from *seco*, I cut]: act or operation of opening a vein for letting blood; bloodletting; phlebotomy. The operation may be performed on any of the superficial veins, but is usually restricted to the veins at the bend of the elbow. Of these veins, the most prominent are the median-cephalic and the median-basilic; the former on the outer side of the tendon of the biceps muscle, the latter on the inner side, and separated from the brachial artery by a thin layer of fascia. Hence, in order to avoid wounding the artery, the median-cephalic should be preferred; but in reality the median-basilic is usually selected, because it is the larger and more prominent vein of the two. The appliances required are a lancet, a bleeding-tape or narrow bandage, lint, a bowl to receive the blood, a basin of water, and a sponge. The patient being placed in a sitting position, the site of the operation is carefully sterilized by scrubbing with hot water and soap and then with a bichloride solution, and the tape or bandage is tied around the middle of the upper arm, tight enough to arrest the venous circulation without materially affecting the pulse at the wrist. The forearm having been allowed to hang down till the veins are tense, the operator taking the blade of the lancet between the forefinger and thumb of the right hand, and having fixed the vein by pressing his left thumb upon it just below the part he is about to open, steadily (and without jerk or plunge) introduces the point of the lancet obliquely until the interior of the vessel is reached, and the blood is seen rising up. Without penetrating deeper, he then thrusts the instrument

forward, so as to open the vein longitudinally to a sufficient extent. On removing the thumb, the blood should emerge in a full jet; but if the stream be scanty, the patient may have a hard object, such as the head of a walking-stick, placed in his hand with directions to grasp it firmly. Another way of increasing the flow of blood is to chafe the palmar surface of the forearm, rubbing from below upward. When a sufficient quantity of blood has been abstracted, the thumb of the left hand should be placed on the wound, and the ligament loosened; a small pad of lint is then placed over the orifice, the surrounding parts are cleaned of blood by a sponge, and the pad of lint compressed against the arm by the tape or narrow bandage, applied in the figure-of-eight form, with the crossing of the tape lying on the pad. The arm should be carried in a sling for a day or two. Among the occasional ill consequences of venesection are: (1) The escape of blood into the surrounding cellular (or connective) tissue, giving rise to a swelling which, if it does not rapidly become absorbed, should be emptied by the lancet: this is due to a lack of coincidence between the wound in the integument and in the coats of the vein. (2) Phlebitis, which generally arises from the use of an unclean lancet or from neglect to sterilize the skin of the arm. (3) Varicose aneurysm, and (4) Aneurysmal varix, both of which may be included under the term Arteriovenous Aneurism (see ANEURISM).

In children, and occasionally in others, in whom the veins of the arm are small and undefined, blood has been drawn from the external jugular veins; but this operation should be limited to extreme cases, inasmuch as the entrance of air into the vein would expose to the danger of instant death. The knowledge of this fact has been applied to the slaughtering of oxen, horses, etc.—as one of the most humane modes of destroying life.

A patient can bear a much greater loss of blood when in the horizontal position than when sitting, and in the sitting position a greater loss than when standing. The condition required to be produced is that there should be incipient faintness; and the loss required to produce this effect varies greatly in different individuals and in different diseases. The average loss of blood required to produce slight faintness in a healthy person in the sitting position has been computed to be 15 ounces. In some diseases a greater loss than this can be borne, in other diseases less. The greatest loss can be born in congestion of the head, or tendency to apoplexy (50 to 40 ounces); then in inflammation of the serous membranes and of the parenchymatous substance of various organs (40 to 30 ounces); then acute anasarca (about 20 ounces); and then inflammation of the mucous membranes (about 16 ounces).

Blood-letting was formerly a ready resort in medical treatment for a multitude of diseases. It is largely disused in modern practice; and the question has been

debated whether it should not be discarded altogether. But in exceptional cases, it remains a valuable remedy.

VENETIA, Territory of, ceded to Austria 1815 (see Venice—*History*), formed from that year, with Lombardy (q.v.), what was called the Lombardo-Venetian Kingdom, one of the Austrian crownlands. In 1859 Lombardy was ceded to Italy, but Venetia continued in the possession of the Austrians till 1866, when, as one of the results of the famous 'Month's War,' it also was ceded to Italy, and is now incorporated with that kingdom. While still in Austrian possession, Venetia was regarded as bounded n. by the Austrian crownlands of the Tyrol and Carinthia; e. by Görz and Gradisca; s. by the Adriatic Sea, the river Po, and the Duchy of Modena; and w. by the river Adige and the Tyrol. The territory of Venetia, ceded to Italy by the treaty of peace 1866, Oct. 3, has the same frontiers which it had as an Austrian province: area of the prov. of Venetia 9,059 sq.m.; pop. (1901) 3,134,467.—See Venice.

VENETIAN, a. *vĕ-nē'shan:* of or from *Venice,* in Italy: N. a native of Venice; a Venetian blind. Venetian blind, a blind for windows formed of long, flat, thin slips of wood, so hung as to be made to stand horizontally above each other, or to overlap. Venetian carpet, carpet with a worsted warp or chain, generally arranged in stripes of different color, the filling or weft, usually black, being concealed and exposed alternately with the warp on both sides. Venetian chalk, a variety of soap-stone or steatite, sometimes used in manufacture of drawing-crayons. Venetian red, n. true Venetian red is said to be a native ochre, but the colors sold under this name are prepared artificially from sulphate of iron, or its residuum in the manufacturing of acids. They are all of redder and deeper hues than light red; are very permanent, and have all the properties of good ochres. Scarlet ochre, Prussian red, English red, and rouge de Mars are other names for the same pigment. Venetian school, in *paint.,* school of painting which arose and declined in the 16th c., and of which Titian (q.v.) is considered the founder. Among its other masters were Giorgione, Tintoretto, and Paul Veronese (see these titles). The distinguishing characteristics of this school were a mastery of color and a consummate knowledge of Chiaro-oscuro (q.v.). See Painting. Venetian window, a main window, with a long and narrow window on each side. Venetian talc, a kind of indurated common talc or steatite, used when reduced to powder for making the colored crayons called pastels.

VENE'TIAN STYLE of Architecture: particular phase of the Renaissance developed in Venice. See Italian Architecture. The Venetian is the most picturesque and ornate of the Italian styles. 'Venetian-Gothic' indicates the peculiar phase of that style com-

COLOMBIA, ECUADOR, AND VENEZUELA.
SCALE OF STATUTE MILES.
0 50 100 200 300
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CARIBBEAN SEA
PACIFIC OCEAN
COLOMBIA
VENEZUELA
ECUADOR
BRAZIL
PERU
GUIANA
ANDES
ISTHMUS OF PANAMA
MOSQUITO GULF
COSTA RICA
BAY OF PANAMA
Gulf of Darien
G. of Maracaybo
Maracaybo Lake
G. of Paria
Gulf of Guayaquil
LEEWARD ISLANDS (OF THE SPAN.)
WINDWARD ISLANDS
St. Lucia (British)
Barbados (Br.)
Grenada (Br.)
Tobago I. (Br.)
Trinidad (Br.)
Curacao (Dut.)
Oruba (Dut.)
Buen Ayre Island (Dut.)
Los Roques
Margarita I. (To Ven.)
Point Gallinas
Goajira Peninsula
Paraguana Peninsula
Santa Marta
Barranquilla
Cartagena
Caracas
Bogota
Quito
Serpent's Mouth
Delta of the Orinoco River
Orinoco
Roraima Mt. 7,300 feet
Parima Mts.
Esmeraldas
Cape San Francisco
EQUATOR
Galapagos Is. (To Ecuador)
Aguja Point
Point Parma
Solimoens
Amazon River
R., McN. & Co. Engr's Chi.

mon in Venice and n. Italy, and applied chiefly to domestic architecture. See GOTHIC ARCHITECTURE.

VENEW, n. *vĕn'ū,* or VENEY, n. *vĕn'ā* [F. *venue,* a coming—from *venir,* to come]: in *OE.,* a bout or turn at fencing; a thrust; a repartee; a sally of wit.

VENEZUELA: a republic lying in the northern portion of South America, bounded on the n. by the Caribbean Sea; on the w. by the Republic of Colombia; on the s. by Brazil; and on the e. by British Guiana; lat. 1° 40′ to 12° 26′ n., long. 59° 54′ to 73° 17′ w. The republic is composed of 13 states, one federal district and four federal territories. The names of the states are as follows: Aragua, Bermudez, Bolivar, Carabobo, Falcón, Guárico, Lara, Mérida, Miranda, Táchira, Trujillo, Zamora, and Zulia. The area of the country claimed and occupied by Venezuela is 593,943 sq.m.—Pop. (1891) 2,323,527. The capital is Caracas; pop. 80,000.

Topography.—The coast line, extending from e. to w., from the delta of the Orinoco to the boundary of the Republic of Colombia, is 1,584 m. in length. Venezuela comprises the plains of the Orinoco basin, in continuation of the Amazon Valley around the mountains of Guiana, partly separated from the Caribbean Sea by the northeast range of the Andes. These plains are traversed by many rivers, the main river being the Orinoco, into which flow the Caroni and Ventuari, traversing and draining with their affluents the Guiana Mountains, the Atabapo, and other rivers. The Upper Orinoco is connected with the Upper Amazon by the channels of the Cassiquiare and the Rio Negro. The mountain system of the Andes extends north and east into Venezuela from Colombia. Between the north and east ranges is the low country of Lake Maracaibo basin. The country east of this basin is an extensive mountain tract, some of the peaks reaching above the limit of perpetual snow. These mountains extend along the north coast, in a double range, having fertile valleys between. There are other mountain ranges in the south and east. The highest peak is the Sierra Nevada de Merida, reaching a height of 15,400 ft. Lake Maracaibo, in the extreme northwest, has an area of 8,392 sq.m., and is connected by an outlet, 8 m. wide, with a gulf of the same name; the waters of the gulf and lake together forming an inland waterway that penetrates the country more than 300 m.

Climate.—The climate is tropical, and very hot in the valleys, the regions of the Lower Maracaibo basin being the hottest found on the western continent. Above an altitude of 2,000 ft. the climate becomes temperate, and cold above 7,000 ft. Much of the mountainous and plateau country has an elevation between these altitudes. The mean temperature at La Guayra is 82°, at Caracas 77°, but at Merida 61°. Wet and dry seasons alternate

on the table-lands. Rain is abundant in the mountain regions.

Zoology.—Large regions of Venezuela, especially in the southwest, comprising the Upper Orinoco basin and plains, are still unexplored, much of the country being densely covered with forests, penetrable only with great difficulty. Fully one half of Venezuela is unbroken forest. These forests abound in wild animals, insects, birds, and reptiles. There are many species of monkeys, all the varieties of South American felidæ, tapirs, deer, ant-eaters, the spectacled bear, the cabaiai sloths, etc. Aquatic birds in enormous flocks are found in the swamps, lakes, and rivers. Tortoises are plentiful, 50,000,000 eggs annually being taken for their oil. Manatees and porpoises ascend the Orinoco. The rivers, bays, and lakes abound in fish of many varieties.

Agriculture.—Agriculture is the principal industry, but is mostly confined to the northern mountainous belt, where the greater part of the population is concentrated. The principal products are coffee, cacao, sugar-cane, tobacco, maize, cotton, and tropical fruits. Wheat is cultivated in some of the higher plains. Indigenous products, cultivated or gathered, include the tonka bean, rubber, copal, sarsaparilla, cinchona, many beautiful cabinet woods, dye woods, herbs, drugs, etc. The agricultural lands amount to about 135,000 sq.m. Great herds of sheep, goats, and cattle are raised on the table-lands and mountain slopes, the export of hides and skins forming an important industry of the country.

Mineralogy.—Venezuela has a great many gold mines. The El Callao mine has had a maximum annual yield of over $3,000,000. Copper, coal, salt, asphalt, silver, lead, tin, iron, sulphur, and petroleum are also found. Guano is exported and bitumen is found in the river deltas and lake basins.

Commerce.—In 1898 the imports amounted in value to $8,560,840 and the exports in the preceding year aggregated $14,900,000. In 1898 the United States imported from Venezuela commodities to the value of $7,722,564 and exported thereto various articles aggregating $2,704,908. Among the United States imports was coffee to the value of $6,171,043. Coffee constitutes about three fourths of the entire export trade and nearly six sevenths of the import trade is subject to duty.

Finances.—The external debt of Venezuela began with its assumption of its share of the old Colombian debt of 1834, which was £2,794,826. In 1903, Dec. 31, the total of the external debt was $30,329,084, and on the same date the total of the internal debt was $18,596,617.

Communications.—The country has few railroads. In 1899 there were 529 miles in operation; in 1903, 4,026 miles of telegraph line with 129 telegraph offices, 12 telephone companies operating 3,242 miles of wire, and 214 postoffices. Wagon roads and mule paths connect

all the interior towns with the capital. The chief channels of intercommunication are the rivers. There are regular steamboat lines up and down the Orinoco and a great deal of short-distance travel is accomplished by small craft. There is steam and cable communication with Europe and with the United States.

Government.—The government of Venezuela is a federative republic, having a president, elected for six years, and a congress of two houses. The government is modeled after that of the United States.

Religion.—The state religion is Roman Catholic, but all other religions are freely tolerated. There are government universities at Caracas, Valencia, and Mérida. There are also, chiefly at Caracas, special colleges, seminaries, military schools, and normal schools, a national library, museum, and observatory.

History.—The east coast of Venezuela was discovered by Columbus in 1498; Ojeda and Vespucci followed in 1499, and, entering Lake Maracaibo, they found an Indian village constructed on piles, to prevent the evil effects of inundation, and they named the place Venezuela, or Little Venice, a name which afterward spread to the whole country. The first settlement was made at Cumana in 1520 by the Spaniards, and Venezuela remained subject to Spain till it claimed independence in 1811. It then returned to allegiance to Spain, but again revolted in 1813, and, forming with New Granada and Ecuador the Republic of Colombia, was declared independent in 1819. In 1830 Venezuela withdrew from the other members of the Free State founded by Simon Bolivar and declared itself a federal republic. The charters of fundamental laws date from 1830, were amended in 1864 and 1881, and are quite similar to the constitution of the United States of America, but permit more independence in local government.

The most notable events in recent years were the boundary dispute with Great Britain, settled by arbitration in 1899; the local disturbances and controversy with Colombia in 1901-2 (see COLOMBIA), and the blockade of Venezuelan ports by several European powers to enforce the payment of certain claims. In the latter part of 1902 and the beginning of 1903 Venezuela's ports were blockaded by the allied powers England, Germany, and Italy, which took this method to enforce certain claims, some of their subjects alleged to hold against Venezuela. Before such demonstration of force, the Venezuelan government, desirous to prevent further complications and to adjust any differences that might exist in regard to the claims, selected the Hon. Herbert W. Bowen, envoy extraordinary and minister plenipotentiary of the United States in Venezuela, to act as its representative in order to negotiate with the blockading powers the final settlement of this vexatious question. After a long and spirited debate, certain protocols were signed in 1903, Feb. 13, and the blockade raised. Ac-

cording to the protocols Venezuela agreed to pay a small amount in cash and submit the bulk of the claims to a mixed commission for adjustment. While the negotiations were being conducted by Venezuela's representative, the important question of preferent rights arose among the claimants, in other words, who should be paid first, whether such powers as had made a display of force or the other creditor powers which had peacefully negotiated the settlement of their respective claims. The question was submitted to the tribunal of The Hague as an arbitrator, and this court decided in favor of the blockading powers.

Public affairs got into a chaotic condition, and Cipriano Castro (q.v.), who had been in a state of revolt, was invited to overthrow the government, in which attempt he was successful, and he was elected president of the republic. Believing in the desirability of preserving the resources of the country for the people of the country, he soon became embroiled with the U. S. and various foreign nations, resulting finally in the blockade of the coast and the capture of one of the republic's naval vessels by a warship of the Neatherlands. Castro's position had by this time become untenable, and on the plea of needing to undergo a surgical operation in 1908 he went to Europe. His enemies took advantage of his absence to deport him and to put Vice President Gomez in his place. The new administration patched up an understanding with the foreign contestants, and peace reigned for a while.

VENEZUELAN BOUNDARY QUESTION: a dispute arising from a disagreement between Venezuela and Great Britain as to their respective boundaries of South American possessions, in which the United States interposed (1895), proclaiming the principles of the Monroe doctrine (see MONROE, JAMES). Between the mouths of the Orinoco and Amazon rivers lies territory which came into the possession of Venezuela 1810, through Spanish title. Adjacent territory, now known as British Guiana, was ceded to Great Britain by Holland 1814. The boundary between the Dutch and the Spanish possessions in S. America was never settled by treaty, and Venezuela and Great Britain through many years could not come to any satisfactory agreement concerning the same. The dispute between these two governments became a grave affair, and resulted 1887 in suspension of diplomatic relations between them, Venezuela claiming all the territory w. of the Essequibo river, and England laying claim to all up to the Pomaron river, w. of the Essequibo. Great Britain had in 1840 claimed the whole Atlantic coast as far as the Orinoco delta; proposed 1844 a boundary-line w. of the Pomaron river; in 1866 claimed to the Guiana river; and in 1890 and 93 proposed still further extension of her claims. Meantime the United States, regarding the claims of Great Britain as seriously conflicting with her

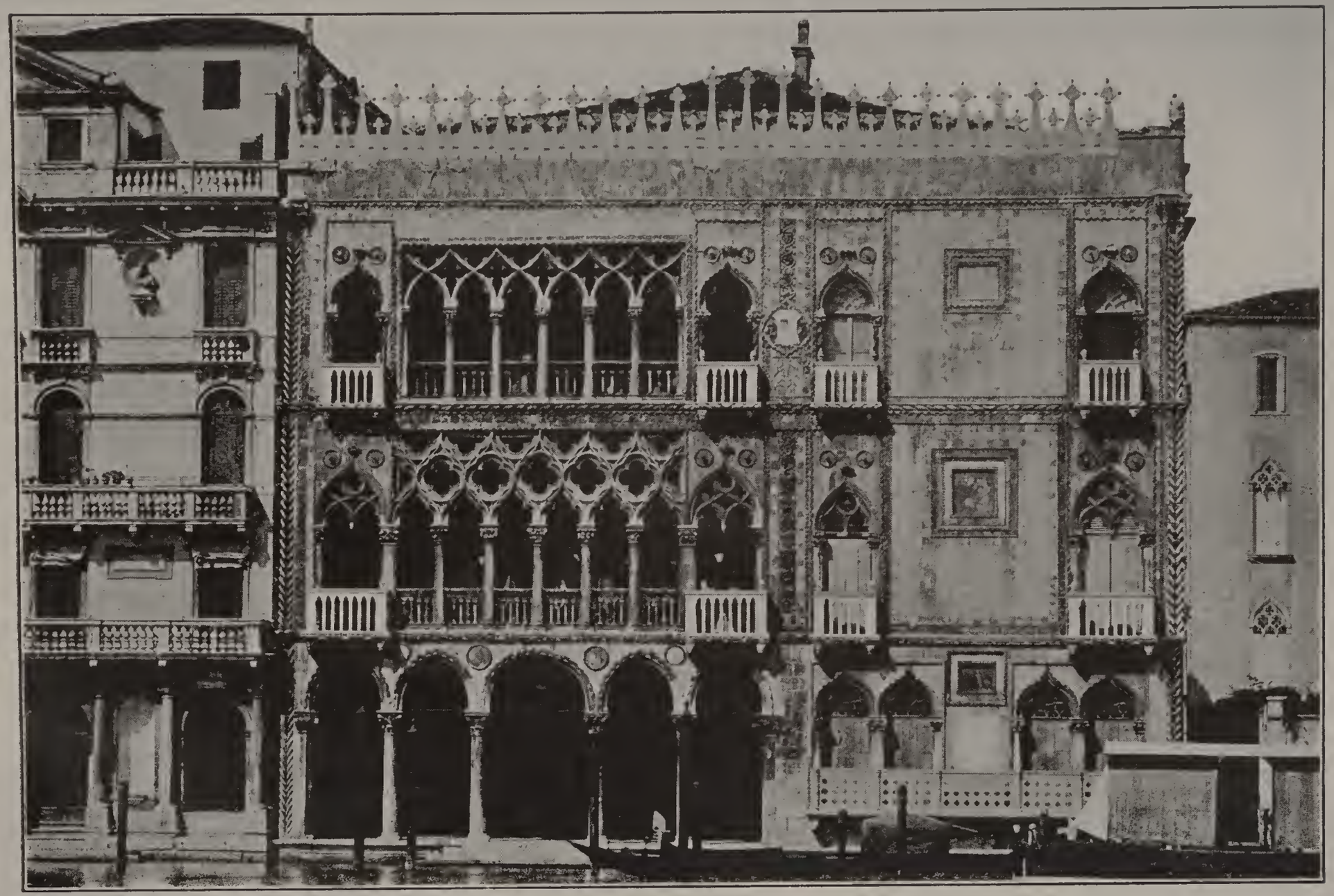
policy of non-interference of European governments with the affairs on the American continent (except in the British possessions in Canada), repeatedly endeavored to induce a settlement of the boundary dispute, but without avail. Early in 1895 a joint resolution of congress recommended to Great Britain and Venezuela the submission of their dispute to arbitration. Venezuela was willing to do so, but Great Britain refused, asserting that Venezuela's claim covered a definitely settled part of her domain, and suggesting that interference by the United States was not desired. In the latter part of the same year Pres. Cleveland laid before congress the correspondence between Great Britain and the United States on the subject, accompanied by a message reiterating the principles of the Monroe doctrine; advising the appropriation of money for the expenses of a commission, to be appointed by the executive, to examine and report upon the boundary question at once; and declaring that when such report should have been made and accepted it would 'be the duty of the United States to resist by every means in its power . . . the appropriation by Great Britain of any lands . . . which of right belong to Venezuela.' By authority of congress the commission was appointed, and both Great Britain and Venezuela agreed to submit to it all documents concerning the dispute, it being agreed that the right of English citizens to property in the disputed territory that had been uncontested for 50 years should not be disturbed. The outcome of this commission was a treaty practically between Venezuela and Great Britain, submitting the claims to arbitration. The tribunal delivered an award 1899, Oct. 3, giving Great Britain her line of 1840, excepting Barima point at the mouth of the Orinoco and a strip of territory between the Wenamu and Cuyuni rivers; but opened the mouth of the Orinoco to Great Britain and both banks of a part of the Cuyuni. War between the United States and Great Britain was narrowly averted.

VENGE, v. *vĕnj:* OE. for AVENGE. VENGE'MENT, n. OE. for AVENGEMENT. VENG'ER, n. *-ėr,* for AVENGE.

VENGEANCE, n. *vĕnj'ăns* [F. *vengeance*—from *venger,* to revenge—from L. *vindĭcārĕ,* to avenge (see VINDICATE)]: the infliction of pain or punishment on another in return for an injury or offense; punishment. VENGE'FUL, a. *-fûl,* vindictive; retributive. VENGE'FULLY, ad. *-lĭ.* TO DO WITH A VENGEANCE, to do with vehemence or in an excessive degree.

VENIAL, a. *vē'nĭ-ăl* [L. *venĭa,* favor, indulgence: It. *veniale,* pardonable]: that may be pardoned or forgiven; that may be excused or permitted to pass without censure; not extremely sinful or reprehensible; in *OE.,* permitted; allowed. VE'NIALLY, ad. *-lĭ.* VE'NIALNESS, n. *-nĕs,* state of being excusable or pardonable; also VE'NIAL'ITY, n. *-ăl'ĭ-tĭ.* VENIAL SIN, in *Rom. Cath. theol.,*

a sin which weakens sanctifying grace, but does not take it away, as *mortal* or *deadly sin* does (see SIN). Rom. Cath. divines infer from many passages of Scripture that there are various grades of guilt in the culpable actions of man, and that these varieties of guilt involve corresponding variation in the liability to punishment. Lowest in this scale of imputability is the class of offenses known as venial, as distinguished from those called mortal. Much difference of opinion exists among Rom. Catholics themselves as to the nature and origin of this distinction. Some ancient writers explained mortal sins as being offenses against a *precept,* whereas venial sins are but violations of a *counsel.* This explanation is now universally rejected; and it is held that sin, of its very essence, whether mortal or venial, supposes the violation of a *law* or precept. Another explanation of the difference declares mortal sin to be that which deprives the soul of sanctifying grace; whereas venial sin only weakens and diminishes, but does not utterly extinguish sanctifying grace in the soul. This is an explanation, however, rather of the effect that of the nature of venial sin; and the more received opinion is that of St. Thomas Aquinas, who explains mortal sin to be that which of itself subverts *the end* of the law; whereas venial sin diverts the law in greater or less degree from that to which God intended that it should be directed. Roman Catholics, while insisting on this distinction, are careful to explain that venial sin, though absolutely pardonable, is not to be supposed to be easily pardonable. They hold that it is of its own nature a great 'deordination,' and that it may and does entail heavy liability to punishment, though not to the eternal punishment of hell, which is reserved for mortal sin. Sins may be venial either objectively or subjectively; objectively, when the 'object' of the law, or what is technically called the 'matter' of the sin, is light or trivial; e.g., in a petty theft, a slight departure from truth, or a passing ebullition of impatience or anger; subjectively, when, even though the 'matter' or 'object' is grave, there is but imperfect advertence, or not full consent, on the part of the subject or agent; e.g., in even a grievous injury done without the doer's full knowledge or intention, or without full and deliberate consent. The degree of culpability in each case is supposed to depend on the objective or subjective qualification of the act. Roman Catholics hold that persons dying in a state of venial sin are not excluded forever from heaven; but that since nothing unholy, even though in a minor degree, can approach God, the soul departing from life so stained with venial sin is compelled to undergo purification in Purgatory, which they conceive to be of greater or lesser severity and duration according to the degree of culpability. Some of these writers teach that even venial sins involve punishment of extreme severity; and all expressly declare that it is never lawful, under any circumstances,



THE HOUSE OF GOLD, VENICE.

to commit the smallest venial sin, even for the purpose of compassing a good and holy object.

Protestants reject the whole doctrine of *mortal* and *venial* sins. They regard all sins as, in one sense, *mortal*, i.e., as exposing the sinner to 'the wrath and curse of God, both in this world and that which is to come;' but all sins of the believer are expiated by the blood of Christ, and are forgiven to the utmost, so that there remains no penalty to be paid, either by penances in this world, or by sufferings after death: they hold also that 'the sin of the world' is so 'taken away' by the Lamb of God (Jn. i. 29) that nothing remains for any human being to do in relation to his sins except to avail himself of his privilege, heartily to repent of them, and to turn from them to God as He is manifested in Christ Jesus. The very notion of venial sins appears to them to make light of the law of God; while that of the expiation of venial sins by the sufferings of the sinner himself is inconsistent with their doctrine of justification, and with their views of the efficacy of the sacrifice of Christ for forgiveness of sins.

VENICE, *vĕn'ĭss:* famous and remarkable fortified city of n. Italy; built on a crowded cluster of marshy islets, in the lagoon of Venice., on the n.w. fringe of the Adriatic Sea, 23 m. e. of Padua by the Milan and Venice railway; lat. 45° 25′ n., long. 12° 20′ e.; extreme length of the city (main portion) $2\frac{1}{2}$ m.; extreme width $1\frac{1}{4}$ m. Venice is now the second seaport of the Adriatic. Pop. (1797) nearly 200,000; (1830) about 100,000; (1881) 132,826; (1901) 151,840.

The lagoon of Venice is banked off from the Adriatic by a long, narrow sandbank, extending s.w. from the mouth of the Piave to that of the Adige, and divided into islands by six narrow sea-passages. The chief of the entrances into the lagoon is the *Porto di Lido* on the e., through which all the great foreign merchant steamers passed direct into the city, and which was deepened by break-waters constructed at great expense in 1882-95. The Porto di Malamocco, between the island of the same name on the s., and that of Lido on the n., is another deep channel into the lagoon. Inside of this sandbank, and between it and the mainland, 3 to 5 m. distant, is the lagoon—a sheet of shallow water, navigable for vessels of very light draught, except where channels have been formed naturally by rivers, and artificially maintained. In some parts of this marshy, sea-covered plain, islets have—by the action of currents and otherwise—become consolidated into ground firm enough to be built upon, and fruitful enough to be cultivated; and in the midst of a crowded cluster of such islets, stated to amount in number to 117 (of which perhaps 70 or 80 may be regarded as principal), the city of Venice stands. In the vicinity of Venice, the ebbing tide (the difference between high and low water is

usually only about 20 in.—on rare occasions, from exceptional causes, approaching 6 ft.) lays bare nearly everywhere a great plain of calcereous mud, laced by an intricate network of narrow channels, from which the sea never retires; while at high water the whole surface is covered by the sea to the depth of 1 to 1½ ft. The chief of the islands upon which Venice is built is called *Isola de Rialto* (i.e., *rivo alto*), or Island of the Deep Stream. The islands, in many places only shoals, afford no good foundations for buildings; and the city mostly is built on artificial foundations of white poplar piles (10 to 11 in. diameter, driven nearly touching one another) or of stone. The fact that this city of marble palaces seems to rise vision-like from the unsubstantial sea, is sufficient to render its aspect at all times fascinating; but in summer and autumn, seasons of the highest tides, when the Grand Place of St. Mark's is partially flooded, and when the image of each palace is doubled by reflection in that 'green pavement, which every breeze breaks into new fantasies of rich tesselation,' the city is marvellously beautiful. The Canalazzo, or Grand Canal—its tortuous course through the city being in the form of the letter S reversed—divides Venice into two unequal parts, and is the main thoroughfare for traffic or pleasure. But the city is subdivided by 146 smaller canals, or rii, as they are termed: these are the water-streets of Venice, affording conveyance to any quarter; for here the canal is the street, and the Gondola (q.v.) is the carriage. In 1880 omnibus gondolas were introduced on the Grand Canal. Access can be had to all parts of the town by land also—across the canals by 380 bridges, and among the houses by narrow lanes called *calli*. There are 306 public bridges, and of these, three cross the Grand Canal—the famed Rialto, a stone structure, and two modern iron bridges, inharmonious with the scene. The Piazza or Square of St. Mark's is the great centre of business and amusement, and the locality most visited by travellers: it is 576 ft. in length, 269 ft. in greatest width, and 185 ft. in least width. The e. side of this square is occupied by St. Mark's Church. The first church of St. Mark's, built 813, was destroyed by fire 976. It was rebuilt 1071, and consecrated before the close of the 11th century. The edifice is Byzantine, with Gothic additions of the 14th century, and Renaissance alterations of the 17th century. It became the cathedral and seat of the Patriarch 1807. The plan of St. Mark's is the Greek cross. Above the doorway are the four famous colossal bronze horses (Græco-Roman in origin) which Enrico Dandolo brought to Venice after the conquest of Constantinople 1204, which were carried away by Napoleon to Paris 1797, and restored to Venice by Francis of Austria 1815. A great dome rises over the intersection of the lines of the cross; and over the transepts other domes arise. The carved work, which is very profuse, is exquisite; and the

building is perfect as an example of the delicately colored architecture of the East. The structure is of brick, incrusted with richly colored marbles. To the right of this beautiful edifice is the *Torre dell Orologio* (1494), with a splendid clock-dial in gold and azure, and very complex and ingenious movements. The n. side of the square is almost entirely occupied by the *Procuratie Vecchie* (1517), for accommodation of the Procurators or trustees of San Marco, who had the care of the edifice, the management of its property, etc. Facing the Procuratie Vecchie, and on the s. side of the square, are the buildings of the *Procuratie Nuove,* connected with a façade, which forms the w. side of the square; and the two buildings constitute the *Palazzo Imperiale.* Leading s. from the Piazza is the Piazetta, or Little Square; and near the point where it makes an angle with the great square, was the Campanile, or Bell Tower, of St. Mark, at some distance in front of the building to which it belonged. It was begun 902, completed 1510; was 323 ft. high, 42 ft. wide at the base, and was surmounted by an angel. In July, 1902, it fell in ruins, but steps were taken to rebuild it. On w. side of the Piazetta are the old Library and the Mint, the former now forming a part of the Palazzo Imperiale. South of the Piazetta are the two famous red granite columns of Venice, one of which is surmounted by a figure of St. Theodore, patron saint of the republic till St. Mark supplanted him; the other covered by the lion of St. Mark. On the e. side of the Piazetta stands the Palazzo Ducale or Doge's Palace. The first palace was reared on the site of the present one 813; and though frequently enlarged, rebuilt, and redecorated, it retained throughout the character of a Byzantine structure. In 1301 its architectural character began to change; and till 1423 all the rebuilding and enlarging were executed in Gothic. There are no buildings in Venetian architecture, properly so called, of date later than 1423; and the alterations in the Ducal Palace after that time, as well as the palaces subsequently built, which took their style of architecture from the Doge's Palace, were in Renaissance, and like almost all the architecture now to be seen in Venice, 'of immeasurably inferior spirit in the workmanship' to that native style which flourished with the republic, and decayed with it. Starting from the landing-place of St. Mark's at the e. extremity of the Grand Canal, and proceeding w., a great number of palaces are passed. In former times, these palaces, or the magnificent buildings which occupied the same sites, were the warehouses and places of business of the great merchant-princes, most of whom possessed mansions in the suburbs, i.e., on some neighboring island, which afforded more privacy than could be found in the city itself. Notable among the palaces are the *Palazzo Giustiniani,* now the *Albergo dell' Europa,* perhaps the best hotel in Venice; the *Palazzo Contrarini Fasan,* a beautiful specimen of the rich-

est Venetian Gothic of the 14th century; on the left bank, the *Palazzo Pisani a S. Polo,* in arabesque Gothic of the beginning of the 15th century; further on, on the right, the *Palazzo Loredan,* the *Ca' d'Oro,* a building of the 15th century; in the oriental style, restored by Mademoiselle Taglioni, the celebrated dancer. The bridge of the Rialto crossing the Grand Canal consists of one arch, whose span is 91 ft., and the height from the water 24½ ft. The bridge with a width of 72 ft., is divided into three streets—the middle one 21 ft. wide—and two rows of shops. The Bridge of Sighs (*Ponte dei Sospiri*) stretches across the canal called the Rio Palazzo, and communicates between prisons on the e., and the Doge's palace on the w. bank of the canal. It is a covered gallery; and prisoners, when led to execution, passed from their cells across this gallery to the palace, to hear their sentence of death, and then were conducted to the scene of execution between the red columns.

The churches of Venice are, as a rule, fine edifices, and of various styles. The styles are chiefly: first, Venetian Gothic, massive and solemn; second, Lombard; third, classical, i.e., Italian; fourth, decorated Italian. Among the chief churches after St. Mark's are those of the *Frari,* with a colossal monument of Titian, a number of excellent pictures, etc.; and the church of *S. Giacomo di Rialto,* at the foot of the bridge of the same name, occupies the site of the first church erected in Venice 421. But of the multitude of churches a great many, though of pleasing proportions, are in the later and degraded styles of architecture. The Fine Art *Academia* is in the ancient convent of *La Carità,* was formed 1807 by Napoleon; and consists of several schools, and has the finest collection of pictures of the Venetian school, including works by Titian, Tintoretto, Bonifacio, Giovanni Bellini, Paola Veronese, and many other masters. Specimens of the works of these artists are also in many of the palaces and churches. There are several theatres, the chief of which is *La Fenice.* Fresh water, formerly, and even still to some extent, obtained at great expense, and of poor quality, from the mainland, or kept in cisterns, is now obtained by means of a number of Artesian wells, sunk 1847, at the expense of the municipality. The library of St. Mark's contains 120,000 vols. and 10,000 MSS. Many writers have led to misconception by omitting to note the fact that the Venice of to-day is far from being the same city as the Venice of earlier and more famous days. On this subject, the following is from Ruskin's *Stones of Venice* (II. 4, 5): 'The Venice of modern fiction and drama is a thing of yesterday, a mere efflorescence of decay, a stage-dream, which the first ray of daylight must dissipate into dust. No prisoner whose name is worth remembering, or whose sorrows deserved sympathy, ever crossed that 'Bridge of Sighs,' which is the centre of the Byronic ideal of Ven-

ice; no great merchant of Venice ever saw that Rialto, under which the traveller now passes with breathless interest.' Among the chief manufactories of Venice are the glass-works, in which magnificent mirrors, artificial pearls, gems, colored beads, etc., are made; and which employ 4,500 people. Jewelry, especially chains of the precious metals, gold and silver stuffs, silks, laces, velvets, soap, earthenware, wax-candles, etc., also are manufactured; and sugar-refining and ship-building are carried on. The trade of Venice greatly declined for several years previous to 1866, because of the uncertain political state of the Venetian provinces. Connection with the railway system and the opening of the Suez canal revived commerce considerably. The goods imported consist chiefly of cotton, coals, coffee, colonial products, woolen and linen yarns, and manufactured goods. Venice is connected by steamship lines with Trieste and the Orient. Annual imports exceed $60,000,000; while exports exceed $50,000,000. Between 3,000 and 4,000 vessels, including coasters, enter the port in a year.

History.—Previously to the Roman conquests, we know almost nothing of history of the district of Venetia, but we know that at the conquest this region was inhabited by two nations, the Veneti and the Carni. The Veneti, from whom the district derived its name, occupied the tract between the Plavis (Piave) on the n., the Athesis (Adige) on the s. The origin and affinities of this people are unknown; and almost the first thing ascertained concerning them is, that in the very earliest times of which we have any record, they were a commercial rather than a warlike community, carrying on a trade in amber, which they brought from the shores of the Baltic, and sold to the merchants of Phœnicia and Greece. Under the Roman Empire, the province became opulent and flourishing; and besides its capital, Aquileia, which rose to be one of the most prosperous cities in Italy, it contained the powerful and wealthy provincial cities, Patavium (Padua) and Verona, and numerous important towns. But before the close of the empire, the early prosperity of this province was swept away by the Huns under Attila, who, 452, razed Aquileia to the ground, and devastated the cities of Concordia, Altinum, Patavium, Vicentia, Verona, and other cities. Many of the inhabitants of these cities, driven from their ruined homes, sought shelter in the marshy lagoons, in a position too miserable to provoke the ambition of the conquerors, and defended from invasion from the mainland by the wide tract of muddy shallows between it and the actual shore, and secured against attack by sea by the shallowness of the water and the intricacy of the sea-passages. Of the cluster of islands on which ancient Venice stood, the principal were Grado Bibione, Caorlo, Heraclia, Equilo, Torcello, Murano, Rialto, Malamocco, Pelestrina, Brondolo, San Nicolo, Chioggia (Piccola and Grande), Amiano, Constanziaco, Olivolo, and Spinalunga.

To Rialto and to Malamocco, the refugees from Padua resorted. The name of the province that they had left was afterward transferred to the cluster of the islands of the lagoon—the new settlement being commonly known, at least as early as the 8th century, as Venezia or as we have it, Venice. Protected by the peculiar position of their island refuge, the settlers engaged in the pursuits for which their situation offered facilities—fishing and the manufacture of salt. Houses began to cluster thickly on the Rialto; and when, 568, Padua was sacked by the Lombards, many of its inhabitants emigrated to that infant colony which their ancestors had helped to found. The first form of government of the island-commonwealth was republican, administered by a consular triumvirate; but 457, the consuls were superseded by tribunes, who, elected annually, and varying in number from one to twelve, administered the government 240 years. But during this period, though the young republic advanced in wealth and population, it gained little political importance. Society was divided into factions by the ambition of the rival tribunes, and variety of interests rendered united action in warfare impossible. With the purpose of remedying the many evils of the government, Cristofero, Patriarch of Grado (island) 697, laid before the Arengo—the periodical convention of the whole adult male population—a scheme in which he proposed that the tribunes should abdicate sovereign power, and that a magistrate, with the title Duke or Doge, in whom should be vested undivided authority in civic, ecclesiastical, and military matters, should be placed over them. The proposition was received with favor, and the election fell on Paolo Luca Anafesto, who was invested by the metropolitan with his insignia of office, a crown of gold and a sceptre of ivory, 697, Mar. Anafesto remained at the head of affairs till his death 717, and under his rule the position of the republic greatly improved. Civil discords were in great measure stilled, and the Venetian territory was increased by a strip of the mainland, obtained by treaty from the king of the Lombards. Under Orso, third Doge (720-737), the Venetians entered on that career of enterprise in which their prudence and their valor were always equally conspicuous, and which they pursued thereafter. In 735, the Lombards seized Ravenna, compelling the Exarch (q.v.) to seek shelter in the lagoon, and implore the republic to lend her aid in reacquiring the lost territory. The Venetians—still considering themselves nominally subject to the eastern emperor, besides being solicitous, in the interests of their commerce, of securing the alliance of Constantinople and obtaining the freedom of the seas of the Eastern Empire—supplied the required assistance, and reinstated the Exarch in his vice-royalty. The services of the Doge on this occasion were rewarded by the Byzantine court with the honorary title Hypatos, or Imperial Consul. The common punishment among the Ve-

THE DOGE'S PALACE AND CAMPANILE, VENICE.

netians for tyranny was putting out the eyes, and the reigns of several of the doges at this time are but periods of tyranny and excess on the part of the ruler, terminated by exoculation or assassination by the people. By a treaty 803 between Charlemagne and the Emperor of the East, it was stipulated that the maritime towns of Istria and Dalmatia should be considered an integral portion of the Eastern Empire. This stipulation was adhered to till 808, when the aggressive policy of Charlemagne, and of his son Pepin, now king of Italy, prompted Nicephorus, Emperor of the East, to dispatch a squadron to the Adriatic, and to seek the alliance of the Venetians; and as the latter perceived that they had much more to gain from the friendship of the court of Constantinople—the key to the rich waters of the East—than from that of Charlemagne, the alliance was soon cemented. War immediately broke out; and Venice was invaded by King Pepin, who took a number of the islands without resistance—the inhabitants having been transferred to the central island, Rialto. The French advanced to the island of Albiola, when, to their dismay, they found that the tide had been ebbing, and that their vessels were stranded in these shallows. The whole French squadron now fell an easy prey to the swift moving galleys of the Venetians; and such of the enemy as escaped being drowned, were massacred by the relentless islanders (809). This struggle, called the battle of Albiola, was conducted on the part of the republic by Angelo Badoer, tribune of the island of Rialto, who was raised to the rank of Doge, and transferred the seat of government to Rialto—the island of Heraclia and others having previously had that honor. In his reign, also, connection was established between Rialto and all the circumjacent islands, by means of wooden bridges, and the cluster thus united now formally took the name Venezia (Venice), though it had commonly received that name early in the previous century. The year 829 is memorable as that in which, according to tradition, the body of St. Mark was transferred to Venice from Alexandria. 'That the Venetians possessed themselves of his body in the 9th century, there appears,' says Ruskin, 'no sufficient reason to doubt;' and however we may regard this story, it cannot be denied that the belief in it by the Venetians and others attracted crowds of pious pilgrims to Rialto, and thus increased the traffic and prestige of the port; while the Venetians adopted St. Mark as their patron saint; and their war-cry, 'Viva San Marco!' inspired their courage in many a fight on sea and land. For many years after this date the history of Venice is marked by no event of special note; but the naval importance, the commerce, and wealth, and refinement of the republic, increased year by year. Doge Orseolo II. (991-1008) greatly extended the trade of the republic by establishing commercial relations between it and the empires both of the East and West, the Crimea, Syria,

Egypt, Tartary, Tunis, etc.; and under his rule, the territory of Venice, which had comprised only the islands of the lagoon, and a narrow strip on the mainland, was increased by further acquisitions on the mainland, and by the addition of the sea-boards of Dalmatia and Istria, which he annexed 998. In 1085 the provinces of Dalmatia and Croatia were formally ceded to Venice by the Emperor of the East; and at the same time the emperor exempted the Venetian traders in all parts of the empire except Cyprus, Candia, and Megalopolis, from all duties and imposts. In 1099, Venice sent forth a fleet of 207 vessels of all sail to the succor of Godfrey de Bouillon and his companions of the First Crusade. The defeat of a hostile Pisan fleet employed by the eastern emperor, Alexius Comnenus, and the capture of 20 of the vessels, and the obtaining of the body of St. Nicholas at the island of Myra, were the chief incidents of this expedition, which partook more of the nature of a predatory cruise than of a pilgrimage and crusade. But it is noticeable that in all the cases in which Venice joined the Crusaders, the chief motive seems rather to have been to monopolize the maritime department of all these movements, and to extend her commercial relations, than to secure the Holy Sepulchre in Christian possession. The great fires of 1106, which, besides destroying the island city of Malamocco, reduced 30 churches and vast numbers of private dwellings in Venice to ashes, were indirectly the cause of great improvements in the architecture of the city; for previously to this event almost all the dwellings were of wood; but after it, the material used was either stone or marble from Italy, Istria, or Dalmatia, in all of which it is abundant.

In 1111 the Doge Faliero sent forth 100 galleys to aid Baldwin I., successor of Godfrey de Bouillon, in the conquest of such Syrian ports as remained in the hands of the Mussulmans; and for this assitance the Venetians obtained the right to hold in possession a church, street, mill, bakery, bath, etc., and to be represented by a local magistrate in each of the oriental possessions of Christendom—rights of the greatest importance to a trading community. In 1123 a fleet sent to succor the Christians in Palestine, and led by the Doge Michieli, distinguished itself by a magnificent victory over an Egyptian fleet, and by the capture of ten Turkish galleons richly freighted. In the same year the Venetians and their allies, the Christians in Palestine, reduced the almost impregnable city of Tyre, after a siege of four and a half months. In 1122, a decree was passed by Johannes Comnenus, Eastern emperor, commanding the Venetian residents at Constantinople and the other Greek ports to quit the imperial dominions, and declaring the suspension of all intercourse between the two powers. The islanders thus saw the most profitable branch of their commerce threatened with extinction; and for reprisals, they launched a fleet 1123; and in that and the following

year they inflicted a terrible punishment on the empire, capturing Rhodes, and investing and sacking Andros, Samos, etc., all the Ionian islands, a portion of the Peloponnesus, etc. Further, this brilliant expedition was not brought to a close until all the Dalmatian fiefs, stirred to insurrection by Stephen, King of Hungary, were again reduced to submission. The Venetians were prominent members of the League of Lombardy against the German emperor; and 1177 won a splendid victory over the Ghibellines headed by Otho, son of Frederick Barbarossa, in defense of Pope Alexander III., who had appealed for protection to the republic. Otho's squadron numbered 75 sail, drawn chiefly from the ports of Genoa and Ancona; the Venetian force consisted of 34 large galleys; and their victory influenced the pope to show his gratitude by presenting the Doge Ziani with a ring, with which he commanded him to wed the Adriatic, that posterity might know that the sea was subject to Venice 'as a bride is to her husband;' and it is recorded that in this year first was celebrated the pompous ceremony of the 'marriage.' The result of the naval battle of Saboro was that Frederick agreed to a congress at Venice 1177. On the occasion of this congress, when the pope, the Doge, and other dignitaries were assembled in the palace of St. Mark's Frederick, approaching the throne on which Alexander III. was sitting, and prostrating himself, allowed the pope to plant his foot upon his neck. The Congress of Venice restored peace between the empire and Lombardy and Sicily. The Doge Ziani died 1178. He did much to improve the architecture of the city, especially of the Square of St. Mark. Of the three lofty red granite pillars which he is believed to have brought from the island of Scio, two adorn the portico of St. Mark's—the third fell overboard and was lost in the attempt to land it. In 1202, Oct., the expedition known as the Fourth Crusade set out from Venice, in Venetian vessels, under the command of the venerable Doge, Arrigo Dandolo: it did not reach Palestine, but directed its force against the Byzantine Empire, which fell into the hands of the so-called Crusaders 1204, Apr. See DANDOLO. On the division of the conquests of this expedition, Venice received the Morea, the Illyric Isles, a large portion of Thessaly, the Sporades, the Cyclades, the cities of Adrianople, Trajanople, Dedymotichos, and Durazzo, the province of Servia, and the coasts of the Hellespont. A fourth part of Constantinople was set apart as a quarter where Venetians might reside, under the protection of their own laws; and all restrictions as to trade were abolished. Venice was now in possession of the fairest portions of the Lower Empire, and she had long been undisputed mistress of the seas. As she increased in power, she increased in magnificence; and her nobles, having no lands in which they might employ their wealth, lavished immense sums on their palaces, their pictures, decorations, and costly garments. Her

palaces were decorated with the treasures and spoils of the East, and a school of artists arose, who found noble subjects for their pencils in the deeds of Faliero, Polani, Ziani, and the Dandoli. Her noblemen were now the most opulent in Europe, and travel and refinement had made them also the most polished.

The most notable events in the history of Venice during the 13th century, are her wars with Genoa, in which her previous good fortune deserted her; and the star of Dandolo succumbed to that of Doria at the desperate battle of Corzuola, from which conflict the Venetians could retire with only 12 out of their 96 galleys, the others being taken or burned; the truce effected between Venice and Palæologus, Emperor of the East, 1268; the electoral reforms by which, after a complex and often repeated process of election and reduction by lot, the 41 members were chosen who formed the Electoral College, and of whom it was necessary that the Doge-elect should obtain the votes of 25 at least. In 1289 the inquisition was formally established in Venice, but subject to so many limitations by the government of the republic, that it was comparatively harmless. In 1310 a conspiracy was formed for correction of abuses that had crept into the constitution, and for the punishment of actual and fancied crimes. Among the conspirators were members of many of the noblest families of Venice. This conspiracy, known as the Quirini-Tiepolo conspiracy, proved abortive; but among other reforms to which it gave rise was the formation of the famous Council of Ten, who caused themselves to be declared a permanent assembly 1335. In 1343 Andrea Dandolo, born in the year of the Quirini-Tiepolo conspiracy, a most accomplished scholar and statesman, was raised to the Dogate. His *Venetian Annals*, remarkable for precision and accuracy, place their author in the first rank of mediæval historians. In 1348, the lagoon was visited by an earthquake, accompanied by the unusually high and destructive tides. The misfortunes were followed in the same year by a frightful visitation of plague; and during six or seven months two-fifths of the population perished, and 50 patrician families became extinct. The middle of the 14th century is remarkable for the famous conspiracy headed by the Doge Marino Faliero (see FALIERI), and for a war with Hungary, in which Venice lost Dalmatia. The commercial rivalry of Venice and Genoa in the East led to a war 1352, in which the Venetians were defeated (1352, Feb. 13) by Paganino Doria in the straits of the Bosporus; and though they recovered their lost laurels in a battle (1353, Aug. 29) off the Sardinian coast, their fleet was totally destroyed by Doria, in the Gulf of Sapienza, 1354, Nov. 3, and they were forced to make peace in the following May. In 1378, the Venetians interfered in the quarrel between the Genoese and Cypriots, and their fleet vanquished that of the Genoese before Antium (July), in revenge for

which the Venetian fleet was almost annihilated off Pola 1379, May, and Pietro Doria, advancing upon Venice itself, seized the island of Chioggia. But the courage of the Venetians was not weakened by their dreadful reverses, and they soon changed the aspect of affairs by becoming in turn the besiegers, blockading the enemy in Chioggia, and, after reducing him to the brink of starvation, accepting an unconditional surrender 1380, June. In 1396, Genoa, the oldest and most harassing foe of the republic, ceased to have separate existence as an enemy, for in that year she placed herself under the dominion of the king of France, to the great relief of Venice, because for several reasons there was now much less chance of a rupture between the two maritime powers. For a number of years after this event, Venice experienced the highest prosperity: a prodigious impulse was given to her trade; her argosies traversed every arm of the ocean; intimate intercourse was kept up with every European country, as well as with Syria, Egypt, and even India; and important articles of Venetian merchandise were the iron of Staffordshire, the tin of Cornwall and Devon, and the wool of Sussex. But no less beneficent than the effects of peace were those of the war which soon broke out between Novello, Lord of Padua, and Venice. At the conclusion of this war (1407), Venice found herself in possession of a territory on the mainland of Italy, whose smallest communal section equalled their ancient island domain, and of which the principal cities were Vicenza, Verona, Padua, Feltre, and Belluno.

With the death of the Doge Mocenigo 1423, a new era opens in the history of Venice; for now 'the central epoch of her life was past, the decay had already begun.' During the next 30 years war was continually waged, chiefly against the Dukes of Milan, in the course of which Venice, taking into pay Carmagnola (q.v.) and his bands, achieved many a splendid victory, and suffered many a disastrous defeat; and though, on the return of peace (1455), the territory of the republic was materially increased, by acquisition of Brescia, Bergamo, Treviso, etc., on the mainland, this territory was obtained only after a struggle, enormously expensive in life and treasure, during which the commerce of Venice —the well-spring of its prosperity at all times—began to decline. Mocenigo's last advice to the senate was to avoid war, which was certain to bring destruction on the country, and to prosecute industriously their trade and commerce, and cultivate the arts of peace. The rejection of this advice, combined with the narrow-minded selfish policy always pursued by the Venetians in the contests among the Italian states, was the prominent cause of its decline. The same fatal warlike policy was pursued throughout the 15th century; and the whole of the 16th century was employed by them in repairing the disasters which the league of Cambrai had brought. The policy of

VENICE-GLASS.

Venice in the 17th century was to aid the opponents of her most dangerous neighbor, Austria, by recognizing Henry IV. of France, aiding Bethlem Gabor and Ragotski, the Duke of Savoy against Spain, and the Protestants against the Roman Catholics of the Grisons. From 1646-69 war was carried on between the Venetians and Turks, the Turks being, in almost every encounter, severely defeated; though, from the disproportionate strength of the antagonists, they ultimately gained Candia, the object of the war. The discovery of the Cape of Good Hope by the Portuguese 1483 opened to that nation an ocean route to India, which was taken advantage of by Vasco da Gama, who rounded the Cape on his voyage from Lisbon to Calicut 1497. The carrying-trade of the world was now no longer, as it had been, in the hands of the Venetians; and the vast commercial activity which sprang up among the nations of w. Europe on the discovery of America clearly showed that the naval superiority of the republic had forever disappeared. But even in spite of these changes of fortune Venice might still have maintained a respectable mediocrity among maritime states but for the character of her government, which was conducted by an exclusive oligarchy, in whose hands all power and freedom were vested. Long prior to the invasion of the republic by Napoleon 1796, Venice had become worn out and corrupted; the government of the Council of Ten had become a reign of terror; its nobles showed vigor only in pursuit of pleasure; its peasants, inured to peace, were unequal to war—all the ancient virtue, valor, and hardihood, which had raised a colony of fishermen, 'perched like sea-fowl' on a muddy shoal, to be a nation of the first rank, had died out of the state. Napoleon 1796 forced Venice to break the neutrality which it meant to maintain, destroyed its government, and ceded the province to Austria by the treaty of Campo-Formio. In 1806 the city of Venice, with the territory of Venetia, was annexed to the kingdom of Italy by the treaty of Presburg; but it was transferred to Austria 1815. In 1866 the city and territory were ceded to and incorporated with the Kingdom of Italy.

The city of Venice is one of the most beautiful in the world, because of the early investment of public funds in beautiful buildings. Although the commerce and trade is comparatively small, the many thousands of visitors who go there every year, keep it a prosperous and living place. The best investment the city ever made was in the purchase of architectural beauty. With the exception of the restored Campanile, which fell in 1902, no building of any size or pretension has been erected for more than 150 years. Its beauty is all of the olden time.

VEN'ICE-GLASS, n.: a glass cup or goblet of rarest purity, manufactured near Venice; believed to be so exquisitely sensitive that it would fly to pieces if poison were put into it.

VEN'ICE-TUR'PENTINE, n.: in *chem.*, a ropy liquid, colorless or brownish, inclining to green, having an unpleasant odor and bitter taste; obtained from *Terebinthina venetia.*

VENI CREATOR SPIRITUS, *vē'nī krē-ā'tėr spĭr'ĭ-tŭs* ('Come, Creator, Spirit!'): anc. and celebrated hymn to the Holy Spirit; used in the Rom. Cath. Church in the offices of the feast of Pentecost, and at coronations, the creation of popes, the consecration of bishops, ordination of priests, etc. Two versions of it are found in the Anglican Prayer-book—'Come, Holy Ghost! our souls inspire,' and 'Come, Holy Ghost! eternal God.' The author is not known with certainty. On the authority of an ancient life of Notker, it is ascribed to Charlemagne; and Daniel, in his *Thesaurus Hymnologicus,* adopts this opinion; but it seems to be older than the age of Charlemagne; and its correct classical meter, as well as the purity of its language, bespeaks an earlier and purer age. Mone makes it highly probable, by intrinsic evidence, that it is the composition of Pope Gregory I. (Gregory the Great).—The *Veni Creator Spiritus* must not be confounded with another hymn to the Holy Spirit, *Veni Sancte Spiritus,* which somewhat resembles it, but belongs not to the Breviary, but to the Missal, in which it forms a 'Sequence' in the Mass of Pentecost Sunday and Octave. The latter hymn is in rhyme, and evidently of later age: its author is believed to be King Robert of France, to whom several other hymns of the same class are attributed.

VENIRE, *vē-nī'rē,* or VENI'RE FACIAS JURATORES, *fā'shĭ-ăs jū-râ-tō'rēz* [L., cause the jurors to come]: writ directing a sheriff to cause to come to court, on a day specified, a certain number of qualified citizens to serve as jurors in the court. In many states jurors are drawn by lot from the list of qualified citizens of the county or town—the list being made by a special officer, or by the selectmen of towns: thus jurors are summoned without a *venire.*—In English law, *venire facias* is also the name of a writ issued to an officer to cause to appear in court a party indicted for petty misdemeanor on a penal statute.

VENIRE DE NOVO, phrase, *vē-nī'rē dē nō'vō* [L., to come anew or afresh]: in *law,* the granting of a second trial, because of some defect which appears on the face of the record itself; differing essentially from a new trial, which is granted only for matter extrinsic to the record.

VENISON, n. *vĕn'ĭ-zn* [F. *venaison,* venison—from L., *venatĭō* or *venatĭōnem,* a hunting, game—from *venor,* I hunt]: a beast or beasts of the chase, or the flesh of such animals; now specifically applied to the flesh of the deer kind.

VENITE, n. *vē-nī'tē* [L., *Venītĕ, exultēmus Domĭnō,*

'Come let us sing unto the Lord,' the first words of the old L. version of the psalm]: Psalm xcv., said or sung in liturgical churches at the commencement of Morning Prayer, after the absolution, Lord's Prayer, and Invitatory Sentences.

VENLO, *vĕn-lō':* frontier-town of Holland, province of Limburg; on the right bank of the Maas, 45 m. n.n.e. of Maastricht, and 60 m. n.w. of Cologne. The town is well built, on elevated ground, surrounded by morasses. Principal buildings are the town-house, the great arsenal, the Church of St. Martin, etc. Venlo has good schools and several charitable institutions. The principal trade is with Germany, in coal, stone, lime, iron, bricks, grain, etc.; the chief industries are stone-hewing, tanning leather, dyeing, grinding corn, beer-brewing, and the making of cigars, starch, vinegar, chocolate, Venlo pepper-cake, etc.—Venlo was a strongly fortified place until 1868, when its forts were dismantled. It was walled by Duke Reynold of Gelder 1343, has often been besieged, and taken and retaken, the last time by the Belgians 1830, in whose hands it remained till the Conference of London, 1839, June 22, when it was returned to the Dutch.—Pop. about 11,000, mostly Roman Catholics.

VENN, *vĕn,* HENRY: clergyman of the Eng. Church: 1725-97, June; b. Barnes, in Surrey. Having studied and entered into holy orders—following the example of his paternal ancestors since the Reformation—he was appointed curate of Clapham; 1759-69 he was vicar of Huddersfield, in Yorkshire; and then was presented to the rectory of Yelling, in Huntingdonshire. The memory of his pure life and fervent preaching has caused his name to be associated with those of John Newton, Thomas Scott, Charles Simeon, and others, as leaders in the evangelical movement in the Church of England. Venn was author of *The Complete Duty of Man*, a sort of development or extension of the *Whole Duty of Man.* His *Life and Correspondence* was published by his grandson, Henry Venn, 1839.

VENNEL, n. *vĕn'nĕl* [F. *venelle,* a narrow street—from mid. L. *venella*, a dim. of L. *vēna,* a vein]: in *Scot.,* a lane or narrow street.

VENOM, n. *vĕn'ŏm* [F. *venin*—from L. *venēnum,* a potion that destroys life: It. *venemo*]: matter fatal or injurious to life, restricted to matter introduced into the system by bites or stings; hence, *figuratively,* anything which acts like poison; spite; malice. VEN'OMED, a. *-ŏmd,* envenomed; poisoned. VEN'OMOUS, a. *-ŏ-mŭs* [F. *venimeux*]: poisonous; armed with poison, as certain animals; noxious; full of malignity; spiteful. VEN'OMOUSLY, ad. *-lĭ.* VEN'OMOUSNESS, n. *-nĕs,* the state or quality of being venomous; malignity.

VEN'OMOUS BITES AND STINGS, wounds inflicted by animals which by their bites or stings introduce

poisonous or irritating matter into the bodies of their victims. We notice here the most venomous animals (1) among the invertebrata, (2) among the vertebrata. (See Holmes's *System of Surgery*—article 'Venomous Insects and Reptiles.')

(1) Among invertebrata, the most formidable poisonous animals are in the classes *Arachnida Myriapoda*, and *Insecta*. The *Scorpions* are characterized by a prolonged jointed abdomen, terminating in a hooked claw, which is perforated, and connected at the base with poison-glands. The larger species, restricted to hot countries, by their sting give rise to symptoms of great severity, and occasionally cause death. 'The symptoms resemble those produced by the stings of wasps and bees in an aggravated degree, such as acute pain, a general nervous shock, attended with numbness, vertigo, occasionally temporary loss of sight, vomiting, etc.; while the local symptoms are swelling, and other signs of acute inflammation, followed, in many cases, by suppuration, sloughing, and their consequences. The remedy which appears to have obtained the greatest repute is the application of ammonia externally, and its internal administration as a stimulant also; although it is probable that any other diffusible stimulus, combined with opiates, would be equally, if not more, efficacious.' Several species of *Scolopendra*, or *Centipedes*, are regarded as highly venomous, and there is no doubt that the bites of some of the larger kinds inhabiting hot countries (especially of *S. morsitans*) have excessively painful consequences, though less severe than those occasioned by the sting of the scorpion. In these animals the poison is introduced not by a caudal sting, but by perforated curved fangs, connected with the mandibles, where poison-glands doubtless exist, though their existence has not been clearly established on anatomical evidence. Although *Spiders* have long had a bad reputation for venomous bites, it is certain that (with some rare exceptions) their bite inflicts no more than a simple wound. The most ill-famed of the spiders is the Tarantula or Tarentula (*Lycosa tarentula*), a citigrade or running spider, common in s. Italy: see TARANTISM. Direct experiments, however, show that the bite of this spider causes usually only a slight local irritation. There is a spider inhabiting the island of Elba (*Aranea 13-guttata*) which is said to be dangerous and even fatal to men and domestic animals; while the cork-forests of Morocco are said to be infested by an equally formidable spider, there known as the *Tendevaman*. Among insects, many inflict more or less troublesome bites; while a comparatively few (almost restricted to the order *Hymenoptera*) inflict serious injury by their stings.

In the case of the majority of biting insects, it is doubtful whether the local discomfort is due to the introduction of poison, or only to the prolonged me-

chanical irritation. In some cases, as in the ants, we know that formic acid (an irritant of great power) is introduced; and considering the prolonged irritation that follows the bites of many small insects, it is probable that there is some special acrid matter in their salivary secretion. This view has further evidence in the fact that persons who suffer much from the bites of fleas and bugs (and the degree of annoyance varies extremely in different persons) are relieved by the local application of hartshorn, or some other preparation of ammonia. The 'Tsetse' (*Glossinia morsitans*), whose ravages are graphically described by Dr. Livingstone, does not attack man; but it affords an example of an insect, very little larger than a house-fly, being able to secrete an intense septic poison, which, introduced by its bites, causes certain death to cattle, the sheep, horse, and dog, while it is innocuous not only to man, but to the goat, antelope, ass, and pig, to all wild animals, and to the calf until it is weaned. Another insect, mentioned but not described by the same traveller, produces by its bite vomiting and purging in man. In the case of stinging insects, the stinging instrument consists essentially of two fine and sharp darts, inclosed in a tubular sheath having at its base a poison-sac, whose contents are injected into the wound made by the darts, which are usually serrated or barbed. The effects of the sting of a bee or wasp are well known; and the sting of the hornet, a much rarer insect, is of the same nature, but aggravated. The sting of a bee or wasp scarcely ever proves fatal, unless the insect is swallowed in a cavity in ripe fruit, or in the act of drinking, and inflicts its sting on the throat. A sting in the fauces usually excites severe and diffuse inflammation, which may extend to the glottis and thus cause suffocation: the treatment must be prompt, and consists of scarification internally, leeches externally, and possibly tracheotomy. When a large number of any of these insects make a combined attack, the result may be fatal. For the bites and stings of all these animals, the remedy recommended for scorpion-stings must be used—viz., ammonia in some form, and probably sal volatile is the best. Among domestic remedies for the irritation excited by these stings are vinegar, oil, spirits, eau-de-Cologne, the blue-ball employed by washerwomen, consisting of indigo, etc. If possible, the sting should be extracted by bringing it to view by pressure over the wound with a watch-key, and then seizing it by small forceps.

(2) Among vertebrata, the only animals capable of inflicting poisoned wounds are the ophidian reptiles or snakes (for the mechanism of their poison-fangs, see SERPENTS: SNAKE): rabid domestic animals must be added (see HYDROPHOBIA: RABIES). The venom is described, when fresh, as a transparent, yellowish or greenish, somewhat viscid, neutral fluid, much resembling saliva in

physical character, and exhibiting no obvious indication of its virulent nature. According to Prince Lucien Bonaparte, it contains, in addition to albuminous or mucous and fatty matters and the usual salts, a peculiar principle, to which he gave the name *echidnine* or *viperine*, which appears to be the active poisonous matter. The poison of the most deadly serpent produces no effect when introduced into the stomachs of living animals, except a slight irritation of the air-passages; nor is its effect more serious when applied to the surface of the skin when free from abrasion. From the experiments of Fontana and others on the poison of the viper, it seems that the venom must be introduced directly into the subcutaneous cellular tissue. When properly introduced through its natural channel, the poison-fang, 'its effects are very rapidly manifested; in fact, in some cases so rapidly as more to resemble those of prussic acid than anything else; usually, however, a brief interval elapses before the effects are shown. These may be divided into general and local. The first symptoms in nearly all cases appear to be a general shock to the nervous system, attended with faintness, tremor, and great depression, sometimes with stupor, loss of sight, vomiting, lock-jaw, and general insensibility; at the same time, great and sometimes intense local pain is set up. The limb, if the wound is in one of the extremities, rapidly swells. In severe cases the swelling continues to spread till it reaches the trunk, or even the entire body, whose surface assumes a jaundiced hue. The gravity of the effects of the bite of a venomous snake appears to be in direct ratio to the comparative sizes of the snake and its victim, and also to the quantity of the poisonous secretion present at the time in the saccular gland. It is also greatly governed by the situation of the wound; one on an extremity, for example, being far less dangerous than one on the face or trunk. It has been remarked that two or more wounds at distant points are more rapidly effective than when they are inflicted on one spot.'—The poison seems to act primarily on the nervous system, also to have a septic action on the tissues with which it is brought in contact; and in order to produce its effects, it must be directly introduced into the circulation.

Besides the well known viper there are many snakes whose bite is fatal. America has the rattlesnake; the E. Indies, the cobra da capello, the ophiophagus, Daboia Russellii, etc.; and Africa and Australia abound in poisonous reptiles. For the principal venomous snakes, see the respective titles. The bite of the viper presents in a mild form the typical symptoms which have been described, and is very seldom fatal. In the case of many snake-bites, however, rapid death is the usual result; and should recovery take place, it will often be protracted and imperfect. The symptoms produced by the bites of different kinds of venomous serpents differ considerably

in character as well as in intensity, though there is general resemblance.

The treatment may be divided into local and general. The local treatment consists in the *immediate* application of a ligature drawn as tightly as possible above the wound—provided the situation of the latter allow of it—to prevent absorption; and the excision and cauterization of the bitten part; and then, after bathing it with warm water, sucking or cupping it. When the position of the bite prevents free excision, the poisoned tissues must be destroyed by *Liquor Ammoniæ*, or nitric acid. The general or constitutional measures consist essentially in the very free administration of the most powerful diffusible stimulants, such as hot strong brandy or whisky and water, and ammonia (an ammoniacal preparation, known as *Eau de Luce*, is a popular remedy for snake-bites). In these cases, in consequence of the prostration of the patient, he can bear an extraordinary quantity of stimulants. For the bite of the rattlesnake, the popular treatment is to make the patient drunk—a process known as the *Western Cure*. Olive-oil, freely administered, has been strongly advocated.—An Australian physician, Dr. Mueller, of Victoria, on the theory that the action of snake-venom is dynamic and not destructive of tissue, and that its sole effect is to produce suspension of the motor and vaso-motor nerve centres, has used as an antidote strychnia, whose effect is to increase the functional activity of those centres. He applies this antidote by subcutaneous injection till slight evidences of strychnia action appear. He declares this treatment successful in a multitude of cases, and now in general use in Australia; though experiments in London and Calcutta on cobra-bitten dogs have not shown the desired results.—The following are a few of the so-called specific remedies said to be used in countries where the most virulent serpents abound: decoction of Virginian snake-root; *Radix corineæ;* guaco, or the *Sacra vitæ anchora;* the Tanjore Pill, whose chief ingredient is arsenic: see SNAKE-STONE.

VENOUS, a. *vē′nŭs* [L. *vēnōsus*, full of veins—from *vēna*, a vein: It. *venoso;* F. *veineux*]: pertaining to a vein; contained in a vein, as *venous* blood; in *bot.*, having veins. VENOUS SYSTEM, in *anat.*, the veins collectively. VE′NOSE, a. *-nōs*, in *bot.*, full of veins; applied to parts or bodies that have many branched veins, as in reticulated leaves. VENOSITY, n. *vē-nŏs′ĭ-tĭ*, the state of being venous; a venous condition of the blood.

VENT, n. *vĕnt* [F. *vent*, wind, scent—from L. *ventus*, wind]: a small aperture through which air can escape or a fluid is let out; passage from secrecy to publicity; escape; act of opening; passage; discharge; means of discharge; utterance; a Scotch name for a chimney: V. to let out; to utter; to emit; to publish; in *OE.*, to sniff; to snort. VENT′ING, imp. VENT′ED, pp. VENTAGE, n.

vĕnt'āj, in *OE.,* a small hole, as in a flute. VENT'AIL, n. *-āl* [OF. *ventaille*]: the breathing-slip of a helmet. VENT'ER, n. *-ėr,* one who vents or utters. VENT- or TOUCH-HOLE, the small passage to the chamber of a gun through which fire is communicated to the charge (see GUN). VENT-PEG, a peg for filling up the vent of a close barrel or cask. TO GIVE VENT TO, to suffer to escape; to let out; to pour forth.

VENT, n. *vĕnt* [F. *vente,* sale: Sp. *venta,* sale, a roadside inn—from L. *vendo,* I sell (see VEND)]: in *OE.,* sale; also, a roadside inn: V. in *OE.,* to sell; to let go to sale.

VENTAGE, VENTAIL: see under VENT 1.

VENTER, n. *vĕn'tėr* [L., the belly]: in *anat.,* the belly; the abdomen.

VENTILATE, v. *vĕn'tĭ-lāt* [L. *ventilātus,* pp. of *ventilārĕ,* to fan, to wave, to toss—from *ventus,* the wind: It. *ventilare:* F. *ventiler*]: to winnow; to expose to the free action of air or wind; to supply with fresh air in order to purify or freshen; to bring under examination or discussion. VEN'TILATING, imp. VEN'TILATED, pp. VEN'TILATOR, *-lā-tėr,* a machine or contrivance for admitting or for regulating the admission of fresh air. VEN'TILA'TION, n. *-lā'shŭn* [F.—L.]: the art or operation of supplying apartments or buildings with a regulated quantity of fresh air (see WARMING AND VENTILATION); the state of being ventilated; utterance; examination; discussion. VEN'TILA'TIVE, a. *-tĭv,* of or pertaining to ventilation; supplying with fresh air.

VENTOSE, n. *vĕn'tōs* [F.—from L. *ventosus,* windy—from *ventus,* wind]: name adopted 1793, Oct., by the French Convention for the 6th month of the Republican year—the 3d winter month, beginning Feb. 19: see CALENDAR.

VENTRAL, a. *vĕn'trăl* [L. *ventrālis,* ventral—from *venter,* the belly]: of or pertaining to the belly; abdominal; in *bot.,* applied to that part of the carpel which is nearest the axis, or in front. VENTRICOSE, a. *vĕn'trĭ'kōs,* or VEN'TRICOUS, a. *-kŭs,* distended; swelling out in the middle or unequally on one side. VEN'TRICLE, n. *-trĭ-kl* [L. *ventric'ŭlus,* the belly, the stomach]: a small cavity in an animal body; a cavity in the heart or brain; one of two chambers in the heart whence the blood is pumped out into the arteries (see CIRCULATION). VENTRIC'ULAR, a. *-trĭk'ū-lėr,* or VENTRIC'ULOUS, a. *-lŭs,* pertaining to a ventricle or small cavity; distended in the middle. VENTRIC'ULITE, n. *-līt,* in *geol.,* a fossil sponge of the chalk formation, usually appearing as a fungiform flint, well known to the inhabitants of Kent and Sussex in England as 'petrified mushrooms.' VENTRAL SEGMENT, in *music,* the segment or loop caused by the vibration of a string and where the amplitude of vibration is greatest;

the points of rest between these segments are called *nodes.*

VENTRICULITES, *vĕn-trĭk'ū-līts:* genus of fossil siliceous sponges, frequent in cretaceous strata: they often form the nucleus around which flints are aggregated, and give their form to the flint-nodules. Ventriculites are sessile and cup-shaped, gradually opening from the base upward. Twelve species have been observed.

VENTRILOQUISM, n. *vĕn-trĭl'ō-kwĭzm,* or VENTRIL'OQUY, n. *-kwĭ* [L. *venter,* the belly; *loqui,* to speak]: the art or practice of speaking or uttering sounds which appear to come not from the person speaking but from some other, or from some unexpected place or direction. VENTRIL'OQUIST, n. *-kwĭst,* one who speaks in such a manner that his words appear as spoken by another near or distant. VENTRIL'OQUIZE, v. *-kwīz,* to speak as a ventriloquist. VENTRIL'OQUIZING, imp. VENTRIL'OQUIZED, pp. *-kwīzd.* VENTRIL'OQUOUS, a. *-kwŭs,* or VENTRILOQUIAL, a. *vĕn'trĭ-lō-kwĭ-ăl,* of or pert. to ventriloquism.—*Ventriloquism* does not depend on any peculiar structure of the organs of voice, but on practice and dexterity, and consists mainly in taking a deep inhalation of breath, and then allowing it to escape slowly, the sounds of the voice being modified and muffled by means of the muscles of the upper part of the throat and of the palate, the ventriloquist availing himself at the same time of means such as are employed by sleight-of-hand performers to mislead the attention. The name Ventriloquism is based on the popular but mistaken supposition that the sounds issued from the belly. Ventriloquism is a very ancient art (see Is. xxix. 4). The Greeks ascribed it to the operation of demons, and called ventriloquists *Engastrimanteis* (belly-seers), also *Euryklytes,* from Eurykles, professor of the art at Athens.

VENTURE, n. *vĕn'tūr* [contr. from ADVENTURE]: an undertaking of chance or danger; a hazard; a speculation; the thing put to hazard; chance or fortune: V. to put or send on a venture or chance; to risk, to dare; to expose to hazard. VEN'TURING, imp.: N. the act of putting to risk or hazard. VEN'TURED, pp. *-tūrd* or *-chûrd.* VEN'TURER, ,n. *-tū-rĕr,* one who risks or puts to hazard. VEN'TURESOME, a. *-sŭm,* fearless; bold; daring. VEN'TURESOMELY, ad. *-lĭ.* VEN'TURESOMENESS, n. *-nĕs,* courage; daring. VEN'TUROUS, a. *-rŭs,* daring; gold; fearless. VEN'TUROUSLY, ad. *-lĭ,* daringly; fearlessly; boldly. VEN'TUROUSNESS, n. *-nĕs,* the quality of being venturous; boldness. AT A VENTURE with the hope of a lucky chance; on chance; at hazard. TO VENTURE AT or UPON, to engage in with the mere hope of success.

VENTURINE, n. *vĕn'tūr-ĭn:* powdered gold used in japanning to cover varnish surfaces.

VENUE, n. *vĕn'ū* [mid. L. *visnētum;* Norm. F. *vesine;* OF. *visnage,* neighborhood—from L. *vicīnus,* neighboring

(see VICINAGE)]: in *law*, the neighborhood or county in which a wrong is committed, and in which it should be tried, and from which the jury must be drawn; the *venue* can now be changed on the consent of the court being obtained.

VENUE, *ven'ū:* same as VENEW (q.v.)

VENUS, *vē'nŭs* [L. *Venus*, Venus—akin to Skr. *wan*, to conceive an affection for]: in *anc. myth.*, the goddess of beauty and love; the planet second in distance from the sun. (See PLANETS, SOLAR SYSTEM): an old name for copper: a genus of mollusks of the family *Veneridæ* (q.v.).

VENUS, *vē'nŭs:* Roman goddess of Beauty and Love, especially of sensual love. Originally Venus does not seem to have been conspicuous in the Latin religion, and scarcely figures in the history of Rome under the kings—a fact that throws some light on the Roman character, in dictating the grave and serious disposition of the people, who highly valued matrimony and wedded joys, but cared little for the sentimental passion of love. Gradually, however, as the myth of the Trojan origin of Rome gained ground, the worship of Venus emerged into importance. The Grecian Aphrodite was the mother of Æneas, and Aphrodite (q.v.) became Venus; Ares was Mars, and Mars was the national god of the Roman people; and as, in the Greek mythology, Aphrodite was beloved of Ares, so, of course, Venus was represented as the paramour of Mars, and thus was advanced by the poets to the dignity of the divine mother of the Roman people. Several temples were erected to her in Rome at different times and under different names; and her rites were celebrated in April—the springtime of the year being thought favorable to tender emotions.

The figure of Venus was a favorite subject of ancient sculptors. One of the most famous specimens extant is the *Venus de' Medici*, preserved in the Uffizi Gallery at Florence, and generally admitted to be the finest relic of ancient art. It was dug up in several pieces, either at the villa of Hadrian, near Tivoli, or at the portico of Octavia in Rome, in the 17th c.; and after remaining for some time in the Medici Palace in Rome (whence its name), was carried to Florence by Sosmo III., about 1680. It is a nude statue, 4 ft. 11½ inches in height without the plinth; and from the exquisite symmetry and grace of the figure, it has become a sort of standard of excellence for the female form. The sculptor was Cleomenes, the Athenian, B.C. 200. The beautiful *Venus of Milo* (correctly *Melos*), now in the Louvre at Paris, was found in the island of Melos 1820. Of modern statues the *Venus Borghese*, by Canova, in the Villa Borghese at Rome, is the most famous.

VE'NUS, in Astronomy: that one of the two inferior planets in the solar system which is nearer the Earth. See PLANETS: SOLAR SYSTEM. The mean distance of

Venus from the sun is 66,134,000 m.; mean distance of its orbit from the earth's orbit about 25,250,000 m. Its estimated diameter is 7,500 m., and its volume is in the ratio 171 : 200 to that of the earth. Its rotation period is estimated at 23 h. 21 m. 15 s. The mean sidereal revolution of Venus is 224.7008 days; its mean synodical revolution 583.920 days. The spots or markings supposed by some astronomers to be visible on Venus are rejected by competent observers armed with the best instruments. Says Sir John Herschel: 'The surface of Venus is not mottled over with permanent spots like the moon; we perceive in it neither mountains nor shadows, but a uniform brightness, in which we may indeed fancy obscurer portions, but can seldom or never rest fully satisfied of the fact. It is from some observations of this kind that both Venus and Mercury have been supposed to revolve on their axes in about the same time as the earth.' It is computed that in lat. 40°, either n. or s. in Venus, the temperature in midsummer is at least twice as high as in the same latitude on the earth; on the other hand, in midwinter, when the sun does not rise above the horizon at all the cold must be as great as at the earth's poles in winter. The spectroscope shows that the atmosphere of Venus contains water.

VENUSBERG, *vē'nŭs-bėrg:* name of several mountains in Germany, especially in Swabia; it appears in Italy also. It occurs first, so far as known, in a poem, the *Children of Limburg,* composed in the Netherlands about 1337 (pub. by Van den Bergh, Leyden, 1846); but since then it appears frequently in the literature of the 15th and 16th c., and has been preserved to the present day in legends and popular songs. According to these accounts, the Lady Venus holds her court in the interior of such mountains, in brilliant style, with song and dance, banquets, and revels. Persons of earthly mold now and then visit her abode (they are represented always as *descending*), and tarry longer or shorter time, some even to the Day of Judgment, leading a life of perpetual delight; e.g., Heinrich von Limburg, a hero of the above-mentioned romance, and the noble Tannhauser (q.v.). Yet they usually run the risk of eternal perdition; therefore the faithful Eckhart sits before the entrance of the mountain, and warns people against entering. The condition of the sojourners does not always present so enticing an aspect; for there are at times heard issuing from the mountain the lamentations of the damned; and Geiler von Keisersberg makes the witches in their night-expeditions rendezvous in the Venusberg. On putting together the various traits of these traditions, it is apparent that they originated in the mythology of the highest German antiquity. The Lady Venus is, under a name borrowed from the classical mythology, the universal Divine Mother of the old German belief, in her peculiar conception of Subterranean God-

THE VENUS DE MILO—THE LOUVRE, PARIS.

dess—the same being that appears under several other German names, each bringing forward some particular side of her character; e.g., Hulda, the Gracious, Benign; Hilda, War; Berchta, the Shining; Hel, the Concealed (from which the Eng. word Hell is derived). In this character of goddess of the under-world, she is surrounded by the elves and other subterranean spirits, unbaptized children, fallen heroes, and the wise women devoted to her services, who, in the way of thinking of later times, were degraded to witches. The queen of Elfland, or Faery, is evidently only another form of the Lady Venus modified by a more decided mixture of Celtic and classic elements.—See Tale of Tamlane, and Thomas the Rhymer, in *Minstrelsy of the Scottish Border*.

VE'NUS'S FLOWER-BASKET. See ZOOPHYTE.

VE'NUS'S FLY-TRAP. See DIONÆA.

VE'NUS'S GIRDLE: an oceanic ctenophoran, remarkable for its shape, which is that of a ribbon, sometimes nearly 5 ft. in length and about 2 in. in width,—a filmy, semi-transparent undulating creature long ago named *Cestus Veneris*, 'girdle of Venus.' This shape is due to thin wing-like expansions in a vertical plane from opposite sides of the body which is in the middle of the 'ribbon,' and conforms to the ordinary ctenophoran, especially when young. Two of the ciliated swimming plates are extended along the upper and lower edge of the ribbon, and the creature swims by the aid of them and by an undulatory action. This curious and elegant jellyfish occurs frequently in warm seas, at all distances from land. Consult Parker and Haswell, *Zoology* (New York, 1897).

VE'NUS'S LOOKING GLASS: very pretty little annual (*specularia speculum*), of the order *Campanulaceæ;* long a favorite in flower-gardens, a native of corn-fields in s. Europe. It has brilliant blue, white, or violet-colored flowers, which fold up in a pentagonal manner toward evening.—In the United States the same name is applied to another species, *S. perfoliata*, common in open sterile ground; the toothed leaves roundish with clasping cordate base, with purple-blue flowers. A remarkable fact is that the earlier flowers are minute, and mature fruit precociously in the bud without expanding, thus having nothing to do with insect agency.

VERACIOUS, a. *vĕ-rā'shŭs* [L. *vērax* or *vērācem*, true —from *vērus*, true: It. *verace*]: observant of truth; habitually disposed to speak truth; true. VERA'CIOUSLY, ad. *-lĭ*. VERACITY, n. *vĕ-răs'ĭ-tĭ* [F. *véracité*]: habitual observance of truth; truthfulness; truth.

VERA CRUZ, *vā'râ krôss:* state of the republic of Mexico, bounded n.w. by San Luis Potosi, n. by Tamaulipas, e. by the Gulf of Mexico and the states of Tabasco and Chiapas; s.w. by Oajaca, w. by Puebla and Hidalgo: about 500 m. long, 80 m. broad; 27,433 sq.m.; capital,

Jalapa. The surface is mountainous; traversed by the range of the Sierra Madre, but on the coast is a level strip about 30 m. wide. In Vera Cruz is the great mountain Orizaba, one of the highest elevations in America. It is a volcano, as are also two other mountains in Vera Cruz, viz., the Cofre de Perote and the San Martin. The mouths of the three chief rivers, the Panuco, the Alvaredo, and the Coatzacoalcos, are obstructed by bars. The coast-plain is highly insalubrious. In the interior the soil is very fertile. The products are sugar, coffee, tobacco, cacao, vanilla, cotton, cereals, and fruits. Cattle are raised in great numbers. The chief mineral products are gold, lead, copper, and iron. The state is divided into 18 cantons.—Pop. about 1,000,000.

VERA CRUZ, or Villa Neuva de la Vera Cruz, *vēl'yâ nwā'vâ dā lâ vā'râ krôss* (the New City of the Real Cross): fortified city and seaport on the e. coast of Mexico, about 263 m. by rail e. of the city of Mexico; with a population of a motley collection from many nations. One of the three Mexican Gulf ports that are open to foreign commerce, the other two not restricted to coastwise trade being Tûxpam and Coatzacoalcos, which are also in the state of Vera Cruz. Among the public institutions or noteworthy buildings are: the Artillery School, People's Library (20,000 volumes), Chamber of Commerce, churches, municipal palace, and theatre. The city is supplied with street railways; the harbor with two lighthouses. For foreign and interior communication by steamship lines, submarine cable, railway, and telegraph, see below. The population of the city in 1900 was 24,085. It is the chief town of the canton which bears the same name. Mr. Robert T. Hill writes: 'Mexico has excluded yellow fever from Vera Cruz, where, until the past ten years, it had an even more tenacious hold than in Havana.' Although Vera Cruz is the chief port for all Mexico, it had for years no proper harbor, but only an open roadstead between the town and the castle. The anchorage was exceedingly poor; when the north gales, or *Nortes* (terrible hurricanes, bearing clouds of sand from the sand-hills behind the town), prevailed many vessels were wrecked on the adjoining shore. But the harbor has been improved by a breakwater and is safer, though not commodious. Railways connect Vera Cruz with Mexico, with Acapulco (passing through Jalapa and Purpla) and with other cities. Tramways also extend through the principal street to the railway station, 2½ m.

The chief exports are the precious metals, cochineal, sugar, flour, indigo, provisions, sarsaparilla, leather, vanilla, jalap. soap, logwood, and pimento; imports, cotton, woolen, linen, and silk goods, brandy, iron, steel, wax, quicksilver, paper, hardware, and cutlery, earthenware, etc. The exports from Vera Cruz 1905 (one-half of all) had a value of about $26,000,000. The chief

articles of export are ores and precious metals, coffee, tobacco (including manufactured), beans and peas, broom root (for brushes), and hides; the principal imports are textiles, metals and hardware, machinery, raw cotton, jute, etc., wines, spirits, and aërated waters, animals and animal products, paper and paper goods, and chemicals. Pop. (1900) 29,164.

VERAGUA, Duke of: dukedom created for the lineal descendants of Christopher Columbus: first borne by his grandson, Luis Columbus, in 1536. It was next inherited by Diego Columbus, great-grandson of the discoverer, upon whose death without issue in 1578 the direct male line of Columbus became extinct. The title was 30 years later settled upon the descendants of Isabel, sister of Luis, the first duke, and upon the extinction of that line in 1733, passed to the descendants of Francesca, sister of Diego, the second duke. The present incumbent, 13th in descent from Christopher Columbus, b. Madrid, Spain, 1837, was, in 1893 the guest of the United States government at the opening ceremonies of the Columbian Exposition, and was received with high honors by the American people.

VERANDA, n. or Verandah, n. *vĕ-răn'dă* [Port. *varanda*, a balcony, a terrace—from Skr. *varanda*, a portico]: a kind of open portico, or light gallery, sometimes latticed, attached to a building on one or more sides, the roof being supported on pillars; popularly but erroneously called *piazza* in the United States.

VERATIN, or Cevadin, $C_{32}H_{49}NO$: a vegetable alkaloid found in certain species of *Veratrum* or *Hellebore*, and along with sabadillin and veratridin in sabadilla seeds. A colorless crystalline powder, very acrid and poisonous. Insoluble in hot water or alkalies, slightly so in ether, very easily soluble in alcohol. It is used somewhat in medicine as a liniment or ointment for external application in cases of acute neuralgia. A very small amount getting into the nostrils causes violent sneezing.

VERATRIA, n. *vē-rā'trĭ-ă*, or Vera'trine, n. *-trĭn*, and Veratrina, n. *vĕr'ă-trī-nă* [L. *vērātrum*, the plant hellebore]: a vegetable alkaloid, obtained from the rootstocks of plants of the genus *Vērātrum*, generally in the form of a white crystalline powder, very acrid and poisonous. Veratrum, n. *vē-rā'trŭm*, a genus of plants, one of which is *white hellebore*, or *Vērātrum album*, ord. *Melanthăcĕæ* (see Hellebore). Vera'tric acid, the acid found with veratria in the genus of plants *Veratrum*.—*Veratria* occurs in cevadilla (the dried fruit of *Asagræa officinalis*), in the bulbs of *Colchicum autumnale*, and in roots and seeds of different species of *veratrum*.

VERAZZANO, *vā-râ-tsâ'no* (or Verrazano, *vĕr-râ-tsâ'no*), Giovanni da: navigator: 1470-1525; b. near Florence. He entered the French maritime service at an early age, and in French annals is credited with visiting

the n. coast of America 1508. Thereafter for years he was a corsair, ravaging the Portuguese and Spanish settlements in the E. and W. Indies: his most valuable prize was the treasureship that was carrying to Spain the spoils of Mexico. In command of a French frigate, he explored the coast of N. America, n. lat. 30°—50°, 1524; made a landing near Cape Fear, and discovered the New York Bay and Narragansett Bay. He landed on Newfoundland, and raised the royal standard of France there in token of French occupation; then he sought the northwest passage. On his return to France he submitted to the king, Francis I., an account of his voyage. The remainder of Verazzano's life is involved in obscurity. According to one account he was assassinated by aboriginals in Newfoundland during a second visit to that island; another account identifies him with 'Juan Florin,' taken by the Spaniards on the s. coast of Spain, and executed as a corsair.

VERB, n. *vėrb* [F. *verbe*—from L. *verbum*, a word: It. *verbo*]: in *gram.*, a word which asserts or declares; the part of speech which affirms, or which in general tells what a person or thing does or suffers; in *OE.*, a word. VERBAL, a. *vėrb'ăl* [F.—L.]: not written; uttered by the mouth; relating to words only; minutely exact in words; literal; in *gram.*, derived from a verb: in *OE.*, full of words; verbose. N. in *gram.*, a noun derived from a verb, e.g., *hanging* from 'hang,' *washing* from 'wash.' VERB'AL-NOTE, n. in *diplomacy*, an unsigned memorandum or note when an affair has continued for a long time without any reply. It is designed to show that the matter though not urgent has not been overlooked. VERB'ALLY, ad. *-lĭ*, by words uttered; orally. VERB'ALISM, n. *-ĭzm*, something expressed orally. VERB'ALIST, n. *-ĭst*, one who deals or is skilled in words; one who is minutely exact, or criticises by words. VERB'ALIZE, v. *-īz*, to convert into a verb: to use a superabundance of words. VERBATIM, ad. *vėr-bā'tĭm* [L.]: word for word; in the same words; in *OE.*, orally. VERBIAGE, n. *vėr'bĭ-āj* [F. *verbiage*]: superabundance of words; empty discourse. VERBOSE, a. *vėr-bōs'* [L. *verbōsus*, wordy]: using or containing more words than are necessary; wordy; prolix. VERBOSE'LY, ad. *-lĭ*. VERBOSITY, n. *vėr-bŏs'ĭ-tĭ*, or VERBOSE'NESS, n. *-nĕs*, employment of a superabundance of words; the use of more words than are necessary. ACTIVE VERB, a verb in which the action passes directly to an object, as, 'John *struck* the dog.' CAUSATIVE VERB, a verb the action of which is caused by the subject, as, 'I *ran* the knife into my hand.' FREQUENTATIVE VERB, a verb denoting a frequent repetition of the action. IMPERSONAL VERB, a verb used only in the 3d pers. singular, as, 'It rains,' 'It snows.' INTRANSITIVE VERB, a verb whose action is confined to the subject, as, 'I sleep,' 'I run,' 'The sun shines.' NEUTER VERB, same as INTRANSITIVE VERB. TRANSITIVE VERB, a verb which carries the action from the subject to an

object, as, 'The girl cooked the food.' PASSIVE VERB, a verb in which the object becomes the subject, a, 'The *bear* was slain by the hunter' (passive) = 'The hunter slew the *bear*' (active).

VERB: that part of speech which predicates or affirms, and is consequently the instrument by which the mind expresses its judgments. No thought can be fully expressed without it: thus it is the most important word in a sentence, and is appropriately called 'verb,' or *the word.* See GRAMMAR; SENTENCE; PARTS OF SPEECH. Verbs affirm either some action or some state; as, 'John *reads,*' 'The sun *shines,* 'The book *lies* on the table.' When the nature of the action requires an object to complete the sense, the verb is called *Transitive,* because the action *passes over* to an object; as, 'The child strikes *the dog.*' Some verbs complete the conception of the action in themselves, and require no complement; as, 'The child *sleeps,*' 'The bird *flies*': these are called *Intransitive.* A distinction is sometimes made between intransitive verbs expressing action (as *flies, moves*) and intransitive verbs expressing a state (as *sleeps, lies*), the latter being called *neuter* verbs: but it is often impossible to draw the line where activity ends and neutrality begins. Even in such a verb as *sleep,* it is implied that the sleeper shows certain outward manifestations that act or make an impression on the beholder; when we affirm that an object *stands, lies,* or even *exists,* or *is,* we in fact affirm that it 'acts,' in this sense. All verbs, thus, agree in affirming action.

Nor can any exact or permanent division be made into transitive and intransitive. We can say whether a given verb in a particular sentence is used transitively or intransitively; but not that it is in itself transitive or intransitive. It would be difficult to find a verb that cannot be shown to be both transitive and intransitive—e.g., in 'He *broke* the glass,' *broke* is transitive, while in 'The glass *broke*' the same word is intransitive. 'The child *sees* the candle,' is an instance of a transitive verb; in 'The new-born child *sees,* but the puppy is blind,' the same verb is intransitive. A verb used transitively has reference to particular acts; when the action is to be *generalized,* all specification of an object is dropped, and the verb becomes intransitive—e.g., 'Men *build* houses' (trans.); 'Men *build,* and time pulls down' (intrans.).

An intransitive verb generally expresses a kind of action that we think of as composed of a number of parts, all like one another; as, 'He *walks, runs.*' Now, with regard to the particular parts, we generally find that the same verb takes an object after it; as, 'He walks *a step, a mile, a long way,*' 'John played *a stroke, a piece, a game.*' 'He did not sleep *a wink*' (sleep being a prolonged winking): and any intransitive verb can take

its cognate noun as an object—e.g., 'He *ran* a *raee*,' 'They *died* an easy *death*,' 'Let me *die* the *death* of the righteous,' 'They *slept* the *sleep* that knows no waking.' In these cases, *step, mile, raee, death, sleep,* are used adverbally; and *walk, ran, died, slept,* are still intransitive verbs.

From certain intransitive verbs, a class of transitive verbs called *eausative verbs* may be formed, as in the following table:

Intransitive.	Transitive.
He sits.	He sets (causes to sit).
" lies.	" lays (" " lie).
" falls.	" fells (" " fall).
" rises.	" raises (" " rise).
" sucks.	" soaks (" " suck).
" drinks.	" drenches (" " drink).
" dives.	" dips (" " dive).

In the ancient forms of our language there were many more such causative verbs, formed from root-verbs by a change, generally of the vowel. In Hebrew, every verb is capable of assuming the causative form. Modern English does not stand much on forms, but employs almost any verb in a causative sense without change of any kind: thus, 'The horse *walked*'—'the groom *walked* the horse;' 'The wood *floated*'—'raftsmen *floated* the wood down the stream.'

One class of intransitive verbs become transitive by addition of a preposition; as *speak—speak to, fall—fall upon.* Some verbs already transitive take prepositions simply to modify the sense; as *set—set up, break—break down.* In such cases the verb and preposition are to be considered as forming one compound verb, and might be written with a hyphen—speak-to, break-down. When a verb has no grammatical subject, or is used with the third person only, it is said to be *impersonal;* as *methinks; it rains; it snows.*

The verb affirms action or existence of a subject under certain conditions or relations called *voiee, mood,* and *tense.* In synthetic languages, such as Latin, Greek, or Sanskrit, these conditions or relations are indicated by modifying suffixes appended to the root of the verb. In the Latin *reg-er-e-mu-s,* e.g., *-er* is added to the stem *reg-* as the sign of past time; to this *e* is added as the sign of mood, *mu-* as the sign of the first person, and lastly *s* as a plural sign denoting others with the person speaking. There are two *voices:* the *aetive,* in which the subject of the verb is represented as acting; and the *passive,* in which the subject of the verb is represented as affected by the action. Instead of 'Cæsar *defeated* Pompey,' we may say, 'Pompey *was defeated* by Cæsar:' in the former, the verb is in the *active voice;* in the latter, in the *passive voiee.* In using the passive voice, the thing or person acted upon is made the subject of the sentence, and has

the chief attention directed to it; with the active voice, the doer and his action are more prominent. Only transitive verbs can have a 'passive' voice; yet by the addition of a preposition some intransitive verbs become capable of being used in the passive voice: thus, 'The king spoke to the duke about it'—'the duke was spoken to about it by the king;' 'Robbers fell upon him'—'he was fallen upon by robbers.'

In English the passive voice is expressed by the passive participle combined with an auxiliary verb—i.e., such verbs as *be, do, will, have, may,* which aid in forming the moods and tenses of principal verbs: see CONJUGATION. A verb with a passive form but an 'active' meaning is called a *deponent* verb (see DEPONE). When the subject and object of a verb are the same, the verb is called *reflexive* or 'self-affecting,' because the action asserted by it turns back upon the subject itself, or has for its object a pronoun representing the subject; as, 'I remember me,' 'I bethought me.' In modern English, 'self' is added to the pronoun to indicate this reflexive meaning, though personal pronouns are sometimes used as they were in Old English—e.g., 'I lay *me* down to sleep.'

Mood is the mode or manner in which action is presented or regarded. Strictly there can be only two moods: (1) the *indicative,* which directly asserts that action is taking place, has taken place, or will take place, as, 'I go,' 'I will go;' (2) the *subjunctive* or indirect mood, which asserts the possibility or supposition of the action taking place, in past, present, or future time; as, 'If I go,' 'I may go:' this is called the *hypothetical,* and sometimes the *conditional* or *conjunctive* mood. The *indicative* mood simply asserts; the *subjunctive* implies uncertainty, or dependence on something else. Besides these moods, grammarians mention others. If action is commanded, we use the *imperative* mood—e.g. *'Go ye;'* but if we state what the action *is* without limitations of any kind as regards voice, time, etc., we use the *infinitive* mood. This, however, is now generally regarded as no mood at all, but simply an abstract noun; and the imperative as only a verbal interjection.

Tense expresses the relation of the action asserted by the verb to the subject as regards time. There are three *tenses: past, present, future.* Each of these may be regarded as *simple,* as *completed,* as *progressive,* or as *inceptive.*

Thus we have:

I. SIMPLE TENSES.

Past	act.	I loved.
	pass.	I was loved.
Present	act.	I love.
	pass.	I am loved.
Future	act.	I shall love.
	pass.	I shall be loved.

II. Completed or Perfect Tenses.

Past Perfect (or *Pluperfect*)	act.	I had loved.
	pass.	I had been loved.
Present Perfect (or simple *Perfect*)	act.	I have loved.
	pass.	I have been loved.
Future Perfect	act.	I shall have loved.
	pass.	I shall have been loved.

III. Progressive or Imperfect Tenses.

Past Imperfect	act.	I was loving.
	pass.	I was being loved.
Present Imperfect	act.	I am loving.
	pass.	I am being loved.
Future Imperfect	act.	I shall be loving.
	pass.	I shall have been loved.

IV. Inceptive Tenses.

Past Inceptive	act.	I was going to love.
	pass.	I was going to be loved.
Present Inceptive	act.	I am going to love.
	pass.	I am going to be loved.
Future Inceptive	act.	I shall be going to love.
	pass.	I shall be going to be loved.

Verbs may be classified according to their meaning, as *causative, inceptive, frequentative, desiderative, factitive,* etc.; according to their origin, as *primitive* or *derivative;* and according to their form, as *regular* or *irregular, redundant,* and *defective.* In English a verb is said to be regular when it forms its past tense and perfect participle by adding *-d* or *-ed* to the present—e.g., *love, loved, loved;* and irregular when these parts are formed in some other way, as by change of the stem vowel—e.g., *drink, drank, drunk.* The former are called *weak* verbs, and the latter *strong* verbs (see Conjugation). A verb is *redundant* when the past tense or perfect participle has more than one form; and *defective* when used in only some tenses or moods.

VERBECK, Guido Fridolin: a citizen of no country but honored in Holland, America and Japan, missionary, educator, and statesman: b. at Zeist in the province of Utrecht, 1830, Feb. 1; d. Tokyo 1898, Mar. 10. He was educated in the languages and humanities in the Moravian Academy at Zeist, often hearing the returned missionaries, especially Gutzlaff of China. He prepared for the profession of engineer in the School of Technology at Delft. Coming to America he was engaged as mechanical engineer in Wisconsin and Arkansas, 1852-6, and entering the Theological Seminary in Auburn, N. Y., graduated in 1859 and as the 'Americanized Dutchman' needed for the mission of the Reformed Dutch Church in America, in Japan, went out and settled at Nagasaki. The Japanese government called him to educational

work in 1863, and thenceforward for nearly twenty years he was in its service, training up many young men who afterwards became the rulers of the nation. He organized the national system of education, superintending the foreign teachers and instructors of the Imperial University in Tokyo, served as secretary to the Genro-in, or Senate, translating the constitutions of European countries, the code Napoleon, Bluntschi's Statts-recht, and various bodies of laws and regulations. He was the originator of the idea of an imperial embassy round the world in 1872, and over one half of its personnel were his former pupils. He was one of the translators of the Old Testament into Japanese and a member of the New Testament revision committee. Unable to claim citzenship in Holland or the United States, the Japanese government awarded him the unique distinction of permanent residence and protection. He wrote the *History of Protestant Missions in Japan* (1872).

VERBE'NA: a name anciently applied to any herb used in religious rites, but now restricted to a genus of plants typical of the order *Verbenaceæ*.

VERBENACEÆ, *vėr-bē-nā'sē-ē:* natural order of exogenous plants, chiefly trees and shrubs, though in part herbaceous plants. The leaves are generally opposite and simple, and have no stipules. The flowers are generally in corymbs or spikes; the calyx is tubular, persistent, inferior; corolla hypogynous, tubular, its limb usually irregular; stamens generally four, two long and two short, sometimes equal—sometimes only two; ovary 2—4-celled, style solitary, terminal; fruit composed of 2—4 achenia united, sometimes fleshy; seeds 1—4. The order contains almost 800 known species, chiefly tropical, some of them natives of temperate countries. The Verbenaceæ are allied to *Labiatæ* both in botanical characters and in properties; but the leaves have no oil-glands. Some are beautiful ornaments of flower-gardens and hot-houses; some are highly esteemed for fragrance; some are used in medicine, e.g., Vervain, etc., though no medicinal plant of much value belongs to the order; the fruit of some species, e.g., *Premna esculenta* and species of *Lantana,* is eaten; the leaves of *Stachytarpheta Jamaicensis* are used as substitute for tea; and the timber of a number of species is valuable. To this order belongs the Teak of India.—Of the United States representatives of this order, besides Vervain, there are the Fog-fruit (*Lippia*), the shrubby so-called French Mulberry (*Callicarpa Americana*), and the Lopseed (*Phryma*).

VERBOECKHOVEN, *vĕr-bûk'ho-vėn,* Eugene Joseph: painter: 1799, June 8—1881, Jan. 21; b. Warneton, Belgium. He was a pupil of his father, a sculptor, in drawing and modelling. His *Cattle Market at Geneva,* exhibited in Brussels 1821, established his reputation as a

promising animal-painter; his greater work, *A Herd of Cattle in an Autumn Landscape,* was bought by Baron James de Rothschild for $10,000. Other great paintings by him are: *A Flock of Sheep overtaken by Storm; A Herd of Cattle in the Campagna; Horses attacked by Wolves.* He published several vols. of etchings.

VERCELLI, *vĕr-chĕl'lē:* venerable city of n. Italy, prov. of Norvara; in a fertile plain, on the right bank of the Sesia; 44 m. w.s.w. of Milan by railway. It covers a wide area, is surrounded by boulevards—those on the n.w. commanding a magnificent view of the Alps—is the seat of a bishop, and has the appearance of great prosperity. The cathedral, an edifice of about the middle of the 16th c., has a libary containing a collection of ancient and valuable MSS. Vercelli is a thriving commercial city.—Pop. 21,000.

VERDANT, a. *vėrd'ănt* [F. *verdoyant,* verdant; *verd,* green—from L. *virĭdis,* green: It. *verde,* green]: green; covered with growing grass or plants; fresh; flourishing; soft; raw; inexperienced. VER'DANTLY, ad. *-lĭ.* VER'DANCY, n. *-dăn-sĭ,* greenness; inexperience. VER'DURE, n. *-dūr* [F. *verdure*—from *verd,* green]: greenness; the fresh color of vegetation. VER'DURED, a. *-durd,* covered with verdure. VER'DUROUS, a. *-dūr-ŭs,* green; decked with green.

VERD-ANTIQUE, n. *vėrd'-ăn-tēk'* [F. *verd,* green; *antique,* ancient]: beautiful green variety of marble, consisting of an aggregate of serpentine and limestone irregularly intermingled.—Oriental *Verd-antique* is a green porphyry, its base dark-green felspar, with dispersed crystals of greenish-white felspar. Beautiful specimens have been found in this country. The name has been given also to Serpentine (q.v.) clouded and veined with gray or whitish limestone, as in a quarry near New Haven, Conn., and in another in Newbury, Mass. Verd-Antique was much prized by the ancient Romans, and is still in great favor in Italy.

VERDERER, n. *vėr'dėr-ėr,* or VER'DEROR, n. *-ŏr* [F. *verdier,* a verderer—from *verd,* green—from L. *virĭdis,* green]: *formerly,* a royal officer employed to look after the vert or every green growing thing in the forest, and maintain the assizes of the forest, etc.

VERDI (FORTUNIO) GIUSEPPE (FRANCESCO): Italian composer: b. Le Roncole, near Busseto, Parma, 1813, Oct. 9; d. Milan, 1901, Jan. 27. His earlier musical education he received from a local musician of Le Roncole and Giovanni Provesi, maestro di cappella of the cathedral of Busseto and director of the Società Filarmonica there; and he wrote for this orchestra several marches, a symphony, and other instrumental pieces now treasured in manuscript in the Busseto library. In 1831 he went to Milan to continue his studies, but upon his application for a scholarship at the Conservatorio was

rejected, and then studied composition and instrumentation with Vincenzo Lavigna. Upon his return to Busseto, he became conductor of the Filarmonica and organist of San Bortolommeo. From 1838 he was again at Milan, where his first opera, *Oberto, Conte di San Bonifacio,* was presented with considerable success at La Scala. *Un Giorno di Regno* (1840), called 'un bazar de reminiscences,' was an utter failure, but *Nabucodonosor* (1842), to a Biblical libretto by Solera, was received so well as at once to establish his reputation. *I Lombardi* (1843), and *Ernani* (1843), with libretto from Hugo's *Hernani,* were even more pronouncedly successful. The Austrian government in both cases made objections to the revolutionary ideas contained in the works. The political demonstrations of the time were no doubt of aid to the composer; and, in fact, the name Verdi was employed by the patriot party as an acrostic for Vittorio Emanuele Re D'Italia. *Ernani* was the first of Verdi's works to be produced in England. He was now kept busy supplying impresarios with operas. Most of these were fiascos, complete or partial. Perhaps the worst was *I Masnardieri,* which Verdi traveled to London to conduct (1847), but could not redeem. Yet with *Rigoletto* (1851) he entered his most brilliant period. This, with *Il Trovatore* (1853), and *La Traviata* (1853), are classed as marking his second manner. They reveal a great advance over *Ernani* in the treatment of both voice and orchestra. Their success in and beyond Italy was very great; they confirmed Verdi's reputation, and they have remained incorporated in the general repertoire of Italian opera. Then followed another series of failures. *Les Vêpres Siciliennes* (1855), written for the Paris Opéra, to be produced during the Universal Exhibition, had, indeed, a somewhat temporary success; and *Un Ballo in Maschera* (1859) has been at intervals revived. Orsini having recently (1858, Jan. 13,) made an attempt on the life of Napoleon, the scene of the latter was changed from Sweden to Boston, Mass., and one Riccardo, earl of Warwick and colonial governor, was assassinated instead of Gustavus III. Verdi was now working out a new method of expression, liberated from the traditional utterance of the Italian school. With *Aïda,* on an Egyptian subject, written at the request of Ismail Pasha and presented at Cairo in 1871, he first declared his third manner, revealing to a considerable degree Wagnerian influence, without, however, surrendering the leading features of Italian music. The orchestral resources were greatly increased, but the vocal score was still the major part of his scheme. A *Requiem Mass,* his only non-operatic work of considerable importance, written in 1874 in commemoration of the death of Manzoni, applied this new manner to sacred music. It was the centre of much discussion, being attacked by von Bülow and defended by Brahms. A revised version of *Simone Boccanegra,* a work which had failed in 1857, was pre-

sented with much success at Milan in 1881; and in 1887 *Otello,* with a libretto by Boito, who had largely rewritten that of *Simone Boccanegra.* Here and in *Falstaff* (1893), a comic opera, with a libretto also by Boito, there is an increase in dramatic characterization. In 1898 Verdi wrote four sacred works, a *Te Deum,* a *Stabat Mater,* an *Ave Maria,* and *Laudi Alla Virgine* (words from Dante). Outside these and the Manzoni *Requiem,* he wrote little save operas, though mention may be made of a string quartet (1873).

VERDICT, n. *vēr'dĭkt* [OF. *verdit;* F. *verdict*—from L. *vērum dictum,* a true saying or utterance; *vērus,* true; *dictus,* pp. of *dicĕrĕ,* to say]: the answer given to the court by a jury on any matter committed to them for examination; a decision; opinion pronounced, as the *verdict* of public opinion. The usual *Verdict* in criminal cases is 'guilty' or 'not guilty;' in civil cases it is a verdict for the plaintiff or for the defendant, according to the fact: these are called general verdicts. In some civil cases the jury, when doubtful, or when the court directing them is doubtful how the law ought to be applied to the facts, find a special verdict, i.e., specific facts, leaving the court to draw the proper conclusion. In criminal cases they may find a special verdict, but are not obliged to do so. Courts have, in general, power to grant or refuse at discretion a new trial after a jury has rendered a verdict: in some cases the law recognizes the right of a person convicted of crime to have a new trial. But a person acquitted of a criminal charge by the verdict of a jury cannot lawfully be put on trial again for the same offense, unless acquittal has been procured by his own fraud or evil practice. The grounds for setting aside a verdict and granting a new trial are many—e.g., failure to give defendant due notice of time and place of trial; irregularity in the procedure of court officers; prejudicing the jury; misconduct of the jury; error of the judge; discovery of new evidence; excessive damages; the fact that the verdict is against the law; obscurity of the verdict.

VERDIGRIS, n. *vėr'dĭ-grĭs* [F. *verd-de-gris*—seemingly from its form a combination of *verd,* green, *de,* of, and *gris,* gray; more probably a corruption of OF. *verderis;* mid. L. *vĕrĭdĕ æris,* verdigris—from L. *vĭrĭdis,* green; *æs,* brass]: a rust of copper or one of its compounds, so called from its peculiar green color; a bluish-green pigment prepared from verdigris, obtained by subjecting copper to the action of a vegetable acid. VERDIGRIS-GREEN, deep green with a mixture of blue.—*Verdigris* or diacetate of copper, $Cu(C_2H_3O_2)_2.2CO + (H_2O)_3$, is largely used for commercial purposes, and for external application in surgery. It is prepared on a large scale by piling up copper-plates with alternate layers of marc or fermenting grape-skins. In a few weeks the surface of the copper is covered with a crust

of the salt, which is detached, made into a thick paste with vinegar, and pressed into molds. The salt thus obtained is in the form of a bluish-green tough mass, not easily pulverized. The formation of the salt by this process is due to the alcohol in the grape-skins being slowly oxidized into acetic acid, while the copper absorbs oxygen from the air and the oxide thus formed unites with the acetic acid. Verdigris may be obtained more directly by placing the copper sheets in cloth dipped in vinegar. Verdigris is permanent in the air; when heated, it loses first water, then acetic acid, the residue being metallic copper. Water resolves it into an insoluble tribasic acetate and a soluble subsesquiacetate of copper—which must be recollected in employing this salt. It is used by the surgeon as a caustic application to venereal warts and fungous growths; it is a good application in ophthalmia tarsi, and has been of service in stimulating old and indolent ulcers, in the ulcerated sore throat of scarlatina, and in malignant ulcer of the tongue. It may be used in the form of an ointment or a liniment. The latter, formerly known as *Mel Ægyptiacum*, is composed of 1 ounce of powdered verdigris, 7 ounces of vinegar, and 14 of honey: the verdigris is dissolved in the vinegar, and to the strained solution the honey is added, and the whole is boiled to a proper consistence. It should be applied with a camel-hair pencil.

Verdigris is an active irritant poison, and accidents from it are not rare, as it is often formed in copper vessels used for cooking, or through the very reprehensible practice of putting copper coins into pickles to give them a fine green color. If copper vessels for cooking are kept perfectly clean, they seem not to be dangerous, provided (1) no acid matter be placed in them; (2) that the boiled materials are at once poured out, and not allowed to stand to cool in them; (3) that the vessels are always at once cleaned. But the interior of copper vessels should always be tinned, care being frequently taken that the tinning remains entire. In cases of poisoning, the best treatment is free administration of white of eggs and milk.

VERD ISL'ANDS. See CAPE VERD ISLANDS.

VERDITER, n. *vėr'dĭ-tėr* [F. *verd-de-terre*, the green of earth]: blue or green pigment obtained by adding finely levigated chalk or whiting to a solution of copper in nitric acid, and extensively used in house-painting. Green Verditer is generally known as Bremen Green. It is formed by a very complicated process from blue vitroil, or sulphate of copper, sea-salt, metallic copper, muriatic acid, caustic potash, and water; and occupies three months in its manufacture. The blue is most valued.

VERDOY, n. *vėr'doy* [OF. *verdoyer*, to put forth leaves, become green—from *verd*, green]: in *her.*, term

applied to a bordure charged with flowers, leaves, or other vegetable forms.

VERDUN, *vĕr-dŭng′:* fortified town of France, dept. of Meuse; on the right bank of the river Meuse; about 150 m. (direct line) e.n.e. of Paris; 174 m. by rail. It was fortified by Vauban (q.v.); and its defenses consist of a wall with bastions, and a citadel which stands on the left bank of the river, on the site of the old Abbey of St. Vennes, dating from the 13th or 14th c. Verdun is the seat of a bishop, has a fine cathedral, and carries on various manufactures. At the time of the Roman conquest Verdun (anc. *Verodunum*) was an important town. It was conquered by Germany in the 10th c.; taken possession of by Henry II. of France 1553; and definitely became French by the treaty of Westphalia, 1648. In 1871, Nov., it was taken by the Germans, who thus established better communication between Germany and their troops before Paris.—Pop. 22,000.

VERDURE, VERDUROUS. See under VERDANT.

VERE, EDWARD DE, 17TH EARL OF OXFORD: English wit and poet; b. England 1550, Apr. 2; d. Newington, Middlesex, 1604, June 24. He was educated at Cambridge, and at 12 succeeded to the earldom with its hereditary dignities, including that of lord great chamberlain of England. He became prominent at the court of Elizabeth when still a boy, took his seat in the house of lords in 1571, and was subsequently a noted figure in court circles. His wit and poetical gifts made him a favorite with Elizabeth, who showered him with attentions; he was famous for his wild extravagance which eventually dissipated his patrimony; and as his years increased he became more than ever eccentric, while his temper, never controlled, acquired, a violence which endangered even his favor with the queen. As lord high chamberlain he presided at the trial of Mary, Queen of Scots, in 1586, and at that of the Earl of Arundel in 1589. He was the author of several popular comedies which have been lost, and his poetry displays much lyric beauty. Of the latter some 23 pieces have been proved as his work, though most of it has perished with his comedies. His extant verse was collected and printed by Grosart in *Miscellanies of the Fuller Worthies Library* (1872).

VERE, Sir FRANCIS, English soldier, grandson of the 15th Earl of Oxford: b. Crepping Hall, Essex, 1560; d. London 1609, Aug. 28. He entered the army in early youth, served under the Earl of Leicester in the Netherlands in 1585, and in 1588 his conduct at the defense of Bergen-op-Zoom won for him the honor of knighthood. He prepared the way for the capture of Zutphen in 1591, was engaged in the taking of Nimeguen in that year, and in 1592 relieved Prince Maurice at Koevorden. He remained in the Netherlands until 1595, and in 1596 he led the expedition against Cadiz. He was again ordered to

Holland in 1597, engaged with Prince Maurice at Tumhout, and in 1598 was appointed governor of Brill and general of the forces in the Netherlands. At the battle of Niewport in 1600 he performed service which turned the tide of battle in favor of Maurice, but was severely wounded and compelled to retire from the field. In 1601-2 defended Ostend with signal success, though against great odds, and in 1606 returned to England, where he was appointed governor of Portsmouth and of the island of Portsea.

VERESTCHAGIN, *vā-rĕs-châ-gēn'*, or WERESCHTSCHAGIN', VASILI VASILIEVITCH: painter: b. Novgorod, Russia, 1842, Oct.; d. 1904, April 13. He studied in the marine school at St. Petersburg, but at the age of 17 began his career as an artist, earning his livelihood as a schoolmaster till 1861, when his father, convinced that the youth had natural gifts for art, gave him the means of foreign travel. Verestchagin pursued his art studies in Berlin and Paris. He accompanied Gen. Kaufmann to Turkestan 1867; in Samarcand he showed great bravery and military resource in a fierce encounter with insurgents. 1870-73 he studied and worked in Munich; then erected in Paris the immense studio in which he painted his colossal pictures. He quitted his art at the summons of the Grand Duke Nicholas to join the army under Gen. Skobelef, and served with highest distinction through the Russo-Turkish war: afterward he transferred to canvass some of the most memorable scenes of that war. At the outbreak of the war between Japan and Russia, he accompanied the forces of his country to the scene of conflict, and on the sinking of the battleship Petropavlosk, 1904, April 13, he went down with the ship.

VERGE, n. *vėrj* [F. *verge*, a rod or twig, the wand borne by an officer as a sign of his authority—from L. *virga*, a rod, a twig]: a rod, wand, or staff, carried as an emblem of authority; a mace, as of a bishop or other functionary; the stick or staff which a tenant held in his hand while swearing fealty to his lord; the limits within which the authority of an officer or court extends, as the verge of a court; the extreme side or end of anything; edge; utmost border; margin; etc.; a mediæval term for the shaft of a column; in a *watch* [F. *verge*, a plain hoop ring]: the balance-wheel, distinguished from the others by the absence of cogs; in *OE.*, circle or ring. VERGER, n. *vėr'jėr*, a wand-bearer; the officer of a court who carries the sword or mace; an officer connected with a cathedral or collegiate church who carries the mace, before the dean or other chief dignitary, in procession, or on any other ceremonial occasion. ROOM AND VERGE, space and margin. VERGE-BOARD: see BARGE-BOARD.—SYN. of 'verge': brim; rim; brink; limit.

VERGE, v. *vėrj* [L. *vergĕrĕ*, to turn, to incline]: to bend; to tend; to approach. VERG'ING, imp. VERGED, pp.

vėrjd. VERGENCY, n. *vėr'jĕn-sĭ,* approach; tendency; inclination.

VERGENNES, Vt.: city in Addison co.; on Otter creek, and on the Central Vermont railroad; about 35 m. w. by s. of Montpelier, 22 m. s. of Burlington, and 7 m. from Lake Champlain. In the summer there are regular steamboat connections with the lake ports. There is here a fall of 30 ft. in Otter creek. The city is the seat of the State Reform School, and has public and parish schools and a public library. There is one national bank with a capital of $150,000. The industries are connected chiefly with farm products.

Vergennes was settled in 1766 and in 1788 was incorporated. It was the first incorporated city in the state. During the war of 1812 the city was an important naval depot; the fleet of Commodore McDonough was fitted out here.—Pop. (1900) 1,753; (1910) 1,483.

VERGIL'IUS (PUBLIUS VERGILIUS MARO). See VIRGIL.

VERGNIAUD, *vĕr-nyē-ō',* PIERRE VICTURNIEN: revolutionist: 1759, May 31—1793, Oct. 31; b. Limoges, France. He was a lawyer in large practice at Bordeaux when the French Revolution broke out, and supported the popular cause with enthusiasm. Elected member of the legislative body 1791, he became its vice-pres. Oct. 16, and pres. Oct. 31. Every law proposed for the enforcement of severe measures against the emigrant nobles was zealously advocated by Vergniaud; he also promoted the proclamation of the republic. He became member of the national convention 1792, and in that body at first favored the proposition to refer to the people the decision of the fate of the king; but that proposition having been rejected, Vergniaud voted for immediate execution, and as president of the convention himself pronounced sentence of death on Louis. Till the downfall of the Girondists, 1793, June 2, Vergniaud was the most brilliant leader of that party, and was the persistent opponent of Robespierre and the *montagnards.* Summoned to meet the charge of treason, he with his friends appeared before the revolutionary tribunal Oct. 24, and made an eloquent and spirited defense; but he and his colleagues were sentenced to death, and Vergniaud was guillotined Oct. 31. His life was written by Touchard-Lafosse—*Histoire parlementaire et vie intime de Vergniaud.*

VERIDICAL, a. *vĕr-ĭd'ĭ-kăl* [L. *vērus,* true; *dicĕrĕ,* to say]: observant of truth; veracious.

VERIFY, v. *vĕr'ĭ-fī* [F. *vérifier,* to verify—from L. *vērus,* true; *facĭō,* I make]: to prove to be true; to make good; to confirm by argument or evidence; in *OE.,* to declare; to sustain. VER'IFYING, imp. VER'IFIED, pp. *-fīd.* VER'IFIER, n. *-fī'ėr,* one who or that which verifies. VER'IFI'ABLE, a. *-ă-bl,* that may be proved or confirmed

VERESTCHAGIN.

by evidence. VER'IFICA'TION, n. *-fĭ-kā'shŭn,* the act of proving to be true. VER'IFICA'TIVE, a. *-tĭv,* tending to confirm.

VERILY, ad. *vĕr'ĭ-lĭ.* See under VERY.

VERISIMILAR, a. *vĕr'ĭ-sĭm'ĭ-lėr* [L. *vērus,* true; *simĭlis,* like]: having the appearance of truth; likely. VER'ISIMIL'ITUDE, n. *-sĭ-mĭl'ĭ-tūd* [L. *similĭtūdo,* likeness]: the appearance of truth; probability; a statement having the guise of probability.

VERITY, n. *vĕr'ĭ-tĭ* [F. *vérité*—from L. *verĭtas* or *verĭtātem,* truth—from *vērus,* true]: truth; a true assertion or tenet; moral truth; agreement of the words with the thoughts. VER'ITABLE, a. *-tă-bl,* agreeable to fact; true. VER'ITABLY, ad. *-blĭ.*

VERJUICE, n. *vėr'jôs* [F. *verjus*—from *verd* or *vert,* green; *jus,* juice]: the juice extracted from green or unripe fruit; an acid liquor expressed from unripe grapes, wild apples, etc.; tartness; sourness.

VERLAINE, PAUL: French poet: b. Metz, Lorraine, 1844, Mar. 30; d. Paris 1896, Jan. 8. He was one of the earliest and most prominent of the so-called 'Symbolistes.' Among his first works were *Poemes Saturniens* (1865); *Les Fêtes Galantes* (1869); and *La Bonne Chanson* (1870). His next volumes, *Sagesse* (1881) and *Les Poètes Inaudits* (1884), a volume of literary criticism, were followed by *Jadis et Naguère* (1885); *Romances sans Paroles* (1887); *Amour* (1888); *Bonheur* (1889); and *Parallèlement* (1890); *Dedicaces* (1894); and *Confessions: Notes Autobiographiques* (1895). He has been said to have introduced new possibilities of rhythm into French as a poetic medium.

VERMEER, JOHANNES (wrongly termed Jan van der Meer of Delft): Dutch painter; b. Delft 1632, Oct. 31; d. there 1675, Dec. 15. He was a pupil of Leonard Bramer and of Fabricius and painted landscapes, architectural views, with special care in the painting of figures to people such scenes. He also produced some portraits and genre pictures. While during his lifetime he filled a large place in the contemporary art world and was dean of the Guild of St. Luke at Delft, twenty years after his death he was almost forgotten, and omitted from Dutch and French *Lives of Painters,* his very name up to 1816 being confounded with that of three other Dutch artists (Van der Meers). It has been ascertained that his father was Janssoon Vermeer, and written documents amply prove that his pictures were sold at a high price at a time when Rembrandt became bankrupt and poverty prevailed in Holland. One of Vermeer's finest works is *A View of Delft* (now at The Hague); *A Dutch Town* (crowded with figures), which was sold in 1872 for $1,785; and among his genres may be mentioned *The Musical Party; The Guitar-player;* and *Young Woman With Her Servant.*

VERMEIL, n. *vėr'mĭl* [F. *vermeil*, lively red, vermilion —from mid. L. *vermic'ŭlus*, scarlet color (see VERMILION)]: a brilliant red; vermilion; a liquid mixture used in gilding; the name given by jewellers to crimson-red garnet inclining slightly to orange.

VERMEJO, *vĕr-mā'cho:* affluent of the Paraguay (q.v.).

VERMES, n. plu. *vėr'mēz* [L. *vermis*, a worm]: worms; name given by Linnæus to the last of the six classes of his zoological system, in which he included all the lower invertebrate animals, whether of worm-like form or not, which he had found no place for in the five other classes —viz., Mammalia, Aves, Amphibia, Pisces, Insecta.

VERMICELLI, n. *vėr'mĭ-chĕl'lĭ* or *-sĕl'lĭ* [It. *vermicelli*, rolled or worm-like paste—from *vermicello;* L. *vermic'ŭlus*, a little worm—from *vermis*, a worm]: a stiff paste or dough of fine wheat-flour made into long, slender, worm-like threads, twisted in small bundles or coils and dried, for the preparation of which Naples is especially famous; a fine kind of *Macaroni* (q.v.), from which it differs in being solid, and not tubular or hollow. It is used in soups, etc.

VERMICULAR, a. *vėr-mĭk'ū-lėr* [L. *vermic'ŭlus*, a little worm—from *vermis*, a worm]: pertaining to or resembling a worm; shaped like a worm. VERMIC'ULATE, v. *-lāt*, to inlay in a manner to resemble the motions or the tracks of worms. VERMIC'ULATING, imp. VERMIC'ULATED, pp. a. disposed in wreathed lines like the undulations of worms, as in *vermiculated work*. VERMIC'ULA'TION, n. *-lā'shŭn*, the act or operation of moving in the form of a worm, as in the peristaltic motion of the intestines; the act of so forming or inlaying as to resemble the motion of a worm; checkering or cancelling formed in mason-work as an ornament, giving the appearance of being eaten by worms. VERMICULE, n. *vėr'mĭ-kūl*, a little worm; a grub. VERMICULOSE, a. *vėr-mĭk'ū-lōs*, or VERMIC'ULOUS, a. *lŭs*, full of or resembling worms. VERMIC'ULITE, n. *-ū-līt* [Gr. *lithos*, a stone]: a mineral resembling talc in appearance, having a granular scaly structure, the scales of which, when highly heated, separate into worm-like threads. VERMIC'ULITES, n. plu. *-līts*, in *geol.*, the smaller and shorter worm-tracks which appear on the surfaces of many flaggy sandstones. VERMIFORM, a. *vėr'mĭ-fawrm* [L. *forma*, shape]: twisted or shaped like a worm or its motions; wormlike in form.

VERMIC'ULITES: a name given to quite a large group of micaceous minerals. The name is derived from the Latin *vermiculari*, 'to breed worms,' and has been applied because of the peculiar property of exfoliation which they possess. Some of the vermiculites exhibit this property in a very striking manner, unfolding when slowly heated, into curious curled filaments whose resemblance to worms seems more than fanciful. They are

all hydrous silicates, formed by the alteration of the micas, chiefly biotite and phlogonite.

VERMIFORM APPENDIX. See APPENDIX VERMIFORMIS.

VERMIFUGAL, a. *vėr-mĭf'ū-găl* [L. *vermis*, a worm; *fugārĕ*, to drive away]: tending to prevent or destroy worms, or to expel them; of the nature of a vermifuge. VER'MIFUGE, n. *vėr'mĭ-fūj*, a medicine that dislodges and expels intestinal worms; an anthelmintic.

VER'MIFUGES, or VER'MICIDES, or ANTHELMINTICS: remedies which possess the property of dislodging and expelling intestinal worms, or of destroying them. *Vermifuges* dislodge and expel; *vermicides* kill; *anthelmintics* is a general term, including all remedies without reference to their mode of action. The only worms whose presence in the intestinal canal is so common that the remedies for their destruction and expulsion require special notice, are the two varieties of tapeworm known as *Tænia solium* and *Tænia mediocanellata*, or the *hooked* and the *hookless Tapeworm* (q.v.); the *Ascaris lumbricoides*, or *large round worm;* and the *Ascaris* or *Oxyuris vermicularis*, or *small thread-worm*. Some anthelmintics are said to be useful remedies as regards all three kinds of worms. Among them are *Absinthium*, or *wormwood*, whose effects are doubtful; *Sabadilla*, or *Cevadilla; Santonica*, or *worm-seed*, and its active principle, *Santonin* (q.v.); and *Oil of Turpentine*. The remedies that have been recommended in tapeworm, ranging them according to the repute in which they stand, are: (1) The root of the male shield-fern (*Aspidium filix mas*), of which the best preparation is the 'Liquid-Extract of Fern-root.' It may be taken in the morning before breakfast, in doses of about a scruple, in the form of an emulsion with yolk of egg, syrup of orange-peel, and water; and if the worm does not come away in six hours, a brisk purgative should be administered. Generally, however, the worm is expelled by a single dose, in the mass, and without pain or much uneasiness. (2) *Cusso* or *Kousso*, the flowers of *Brayera anthelmintica*, in doses of half an ounce to an ounce of the flowers (infused for a quarter of an hour in ten ounces of lukewarm water, and a little lemon-juice), or of four ounces of the infusion of the pharmacopœia, and followed in four hours, if it has not acted, by a dose of castor-oil—a safe and sure remedy. (3) Decoction of the bark of the root of the Pomegranate tree (*Granati radix*). (4) *Oil of Turpentine* (q.v.). Besides these, the seeds of the Common Pumpkin (*Cucurbita pepo*); *Kamela*, the powder adhering to the capsules of *Rottlera tinctoria;* Santonin, etc., have found their advocates. All anthelmintics should be taken fasting, or after a light supper on the previous evening.

Foremost among remedies for *Ascaris lumbricoides*, or large round worm, Cobbold places *Santonin* (q.v.); but

kamala also is very efficacious in doses of one to two drams every four hours. Waring, in *Materia Medica,* gives a long list of remedies employed with success in the East, but unknown in western lands. *Ascaris vermicularis,* or the *thread-worm,* is more successfully attacked locally in the rectum by injection, than by medicines administered in the ordinary method. Among the best forms of enemata are half a dram of tincture of sesquichloride of iron in a little gruel, retained in the bowel as long as possible; or injections of salt and water, or of infusion of quassi. As an internal remedy, santonin is the best. The most annoying symptom occasioned by these worms, the intense itching about the lower part of the bowel, especially in the evening and at night, is best relieved by introduction of a little mercurial ointment within the verge of the anus, when the patient retires to rest.

VERMIGLI, *vĕr-mēl'yē,* PIETRO MARTIRE, *pē-ā'tro mâr'tē-rā* (Peter Martyr): theologian: 1500, Sep. 8—1562, Nov. 12; b. Florence, Italy. As member of the order of Augustinian canons regular, he was famous throughout Italy for learning and eloquence. Conversation with a convert to Protestantism, and the subsequent reading of works by Bucer, Zwingli, and Melanchthon, led Vermigli to adopt the doctrine of the Reformers. He still remained in the Augustinian order, and was prior of a convent in Lucca, when, his sympathy with the leaders of the Reformation becoming known, he had to flee from Italy and take refuge in Switzerland 1542. He became afterward professor of theology in Strasburg. Invited to England by Archbishop Cranmer 1547 he became lecturer on the Scriptures at Oxford University. When Mary became queen, Vermigli returned to Strasburg, where he lectured on Aristotle's philosophy till 1556, then becoming professor of theology of Zurich. His latest work, *The Commonplaces of the Most Famous and Renowned Divine Doctor Peter Martyr,* as it is entitled by its editor, Anthony Marten, was dedicated to Queen Elizabeth.

VERMILION, n. *vėr-mĭl'yŭn* [F. *vermillon,* vermilion; *vermeil,* ruddy—from mid. L. *vermic'ŭlus,* scarlet color—from the worm, L. *vermis,* of the gall-nut, from which a red color was obtained]: a brilliant red pigment originally prepared by grinding native cinnabar to a powder, but now made artificially by subliming the red sulphide of mercury or cinnabar; any similar brilliant red: V. to cover with vermilion or any delicate red color. VERMIL'IONED, pp. a. *-yŭnd,* dyed with a bright red. VERMIL, n. a. *vėr'mĭl,* in *OE.,* vermilion; of the color of vermilion.—*Vermilion,* or artificial Cinnabar (q.v.), is a bisulphide of mercury, formed by mixing 100 parts of the metal with 16 parts of sulphur, and subliming them in properly constructed retorts; the result is, a heavy dull-red cake, about an inch in thickness, of an acicular crystalline

texture, and exactly resembling in these respects the native cinnabar. When, however, it is finely powdered, it acquires the beautiful bright red color well known in this pigment. The finest European vermilion was formerly made at Utrecht in Holland; it is now manufactured in other places, particularly in Istria. A new process, invented by Kirchoff, has also been introduced and is employed in most manufactories for making the finest quality. It is called the humid or wet process, from the employment of water, with which the ingredients are triturated at a temperature of not more than 130° F., until the mixture, at first black, turns brownish red, when the temperature is lowered to 114° F., and steadily maintained at that until the brightest color is obtained; it is then allowed to subside, the liquid is decanted off, and the residue washed in clean water. The Chinese have always been famous for the beauty of their vermilion.

VERMILLION, S. D.: city, county-seat of Clay Co.; on the Missouri river at the mouth of the Vermillion, and on the Chicago, Milwaukee and St. Paul railroad; about 34 m. n.w. of Sioux City, and 28 m. s.e. of Yankton. It was settled in 1859 by a colony from the eastern states, and was incorporated in 1877. It is an agricultural and stock-raising region. The chief manufactures are flour, wagons, sash, doors, and blinds, and dairy products. There is considerable trade in farm products and live stock. The principal public buildings are the county courthouse, the opera house, and the school houses. There are seven churches. The educational institutions are the State University, a high school, founded in 1880; St. Agnes' Academy, public and parish schools, and a public library. The two banks have a combined capital of $100,000. The average amount of business annually is $700,000. The government is vested in a mayor and a council of eight members, elected biennially. Pop. 2,800.

VERMIN, n. *vėr'mĭn* [F. *vermine*, vermin—from L. *vermis*, a worm]: any kind of disgusting or hurtful creatures of small size; term applied to persons in contempt. VER'MINATE, v. *-nāt*, to breed vermin. VER'MINA'TION, n. *-nā'shun*, a breeding of vermin; a griping of the bowels. VER'MINOUS, a. *-ŭs*, breeding vermin; springing from the presence of vermin. VER'MINOUSLY, ad. *-lĭ*.—*Vermin* is a term applied to noxious and disgusting insects, e.g., lice, fleas, bed-bugs, etc., as well as to such small mammals as multiply rapidly and are injurious to crops, etc., or infest dwellings, etc.; among the more common and destructive of the last class are rats, mice, weasels, polecats, squirrels, rabbits, moles, etc. Among vermin, in some places, are reckoned such birds as are injurious to crops. Small birds, such as feed both on insects and seeds, are not to be regarded as vermin. They consume, it is true, a certain portion of the grain; but

they are of incalculable use in devouring those insects which are the worst of all destroyers of crops. The consequences which have ensued from the great reduction of the numbers of small birds in France, where they are eagerly sought for the table, are a warning to the farmers of all other countries. The most intelligent agriculturists of France are now solicitous for the increase of the numbers of small birds, as their only protection against caterpillars and grubs of many kinds. In the economy of nature a balance of power is rigidly observed, and in the maintenance of such a balance the so-called vermin play an important part. The lemmings present an instance of how the equilibrium is naturally restored. It is rarely needful or wise, at any rate with reference to birds and small mammals, for man to interfere when a case, like that of the prairie-dogs of the western United States arises; where repression is necessary, it is usually the result of previous human interference with nature's arrangements. Agriculturists are beginning to recognize that the birds which visit their fields are of extreme value in the repression of the insects and their larvæ which feed on the tender shoots of the grain. And even admitting that the fields may occasionally suffer from the visitation of common birds, the damage inflicted thereby is but trifling when compared with their services in repressing the insect species. Even the much persecuted mole has been shown by Darwin to be a thorough fertilizer of the ground, and the earthworm itself acts in this way also. Both animals, in fact, by their operations in turning over the soil, in bringing fresh layers to the surface, and in breaking the clods, tend to open up the ground, and thus to ensure favorable conditions for the germination of the seed. And the despised and hunted rats may be shown, like the whelks and crabs of the sea, to play no unimportant part in nature's sanitary arrangements, by the wholesale destruction of offal and garbage in which they indulge. But as the connection of these rodents with the spread of the bubonic plague is established beyond doubt, their ultimate extermination may be looked for.

Among means for destruction of vermin are traps and poison and the introduction of infectious fatal diseases. The common spring-trap for rats is liable to the objection that cats or dogs may be caught in it. Rats also learn to suspect danger, and avoid the trap, guided probably by their sense of smell, which is very acute and apprises them of the touch of human hands. To overcome this difficulty, oil of aniseed, or oil of caraway, is often used; which seems to render the bait more attractive, while it overpowers the warning smell. Professional rat catchers ascribe especial value to oil of rhodium, but it is more expensive than the oils above named. Rubbing the hands with a mixture of essential oils before setting the trap will prevent the scent of the hands from being noticed by rats. Mixture of oils

recommended for rats: oil of rhodium 1 scruple, oil of caraway 1 dram, oil of lavender 5 drops, oil of aniseed 10 drops, tincture of musk 2 drops. A good poison for rats, and scarcely dangerous to other animals, is the following: hog's-lard is melted in a bottle plunged in water at a temperature of 150° F., and an ounce of phosphorus is added to every pound of lard, with a quantity of proof-spirit, to aid the mixture of the lard and phosphorus, which, when cooled, form a white mass, the spirit separating from it, so as to be fit for use again. This compound, very gently warmed, and mixed with flour and sugar, may be made into pellets, flavored with some of the attractive oils, and laid down near rat-holes, or where field-mice are very abundant. For a method of destroying the field-vole, or short-tailed field-mouse, by digging pits, see VOLE. Another method of destroying rats is that of spreading the floor with caustic potash, which, adhering to the rats' feet, is licked off: the result is obvious.

VERMIPAROUS, a. *vĕr-mĭp'ă-rŭs* [L. *vermis,* a worm; *parĭō,* I produce]: producing or bringing forth worms. VERMIV'OROUS, a. *-mĭv'ō-rŭs* [L. *voro,* I devour]: feeding on worms.

VERMONT, *vĕr-mŏnt':* state; one of the United States of America; first in order of admission into the Union under the federal constitution; popularly known as the 'Green Mountain State.'

Location and Area.—Vermont is in lat. 42° 44′—45° n., long. 71° 30′—73° 26′ w.; bounded n. by Quebec, Canada; e. by New Hampshire; s. by Massachusetts; w. by New York; extreme length n. to s. 157½ m., breadth 35-85 m.; Lake Champlain waterfront 105 m.; land area 9,135 sq.m., water 430 sq.m., gross 9,565 sq.m. (6,121,600 acres); highest elevation Mount Mansfield, 4,430 ft.; principal harbor Burlington; capital Montpelier.

Topography.—The Connecticut river forms the entire e. boundary of the state, and Lake Champlain two-thirds of the w. boundary. The Green Mountains, which extend entirely through the state nearly n.e. to s.w., enter it by two distinct chains from Canada, the w. directly, the e. by way of n. New Hampshire, and unite at the 44th parallel, extending thence into Massachusetts, near the Hoosac Tunnel. The mountains thus provide a continuous and nearly central line of watershed, the region on the e. being drained by the Connecticut river and its affluents; that on the w. by the feeders of Lake Champlain, such as the Missisquoi, Lamoille, Winooski, and Poultney rivers, and Otter and Hubbardton creeks; while the extreme n. region has additional drainage from streams entering Lake Memphremagog. The highest points of the Green Mountains, all less than the highest of the White Mountains in New Hampshire, are, according to Prof. Guyot, the 'chin' and 'nose' of Mount Mansfield, 4,430 and 4,094 ft. respectively; the 'forehead,'

or South Peak, 3,934; Killington Peak 4,221; Killington Dome 3,954; Camel's Hump 4,088; Equinox Mountain 3,872; Shrewsbury Peak 3,845; Green Peak 3,148; Mt. Lincoln 4,078; Mt. Sterling 3,700; Hogback Mountain 3,648; Jay Peak 4,018; Bald Mountain 3,124; and the detached Mt. Ascutney 3,320. Besides the rivers, creeks, and lakes mentioned, there are nearly 100 bodies of water, some of considerable size, including Willoughby, Seymour, Maidstone, Dummer, Bombazine, Austin, and Great Trout Pond; also the medicinal mineral springs of Alburg, Brunswick, Clarendon, Hartford, Highgate, Newbury, Panton, and Williamstown.

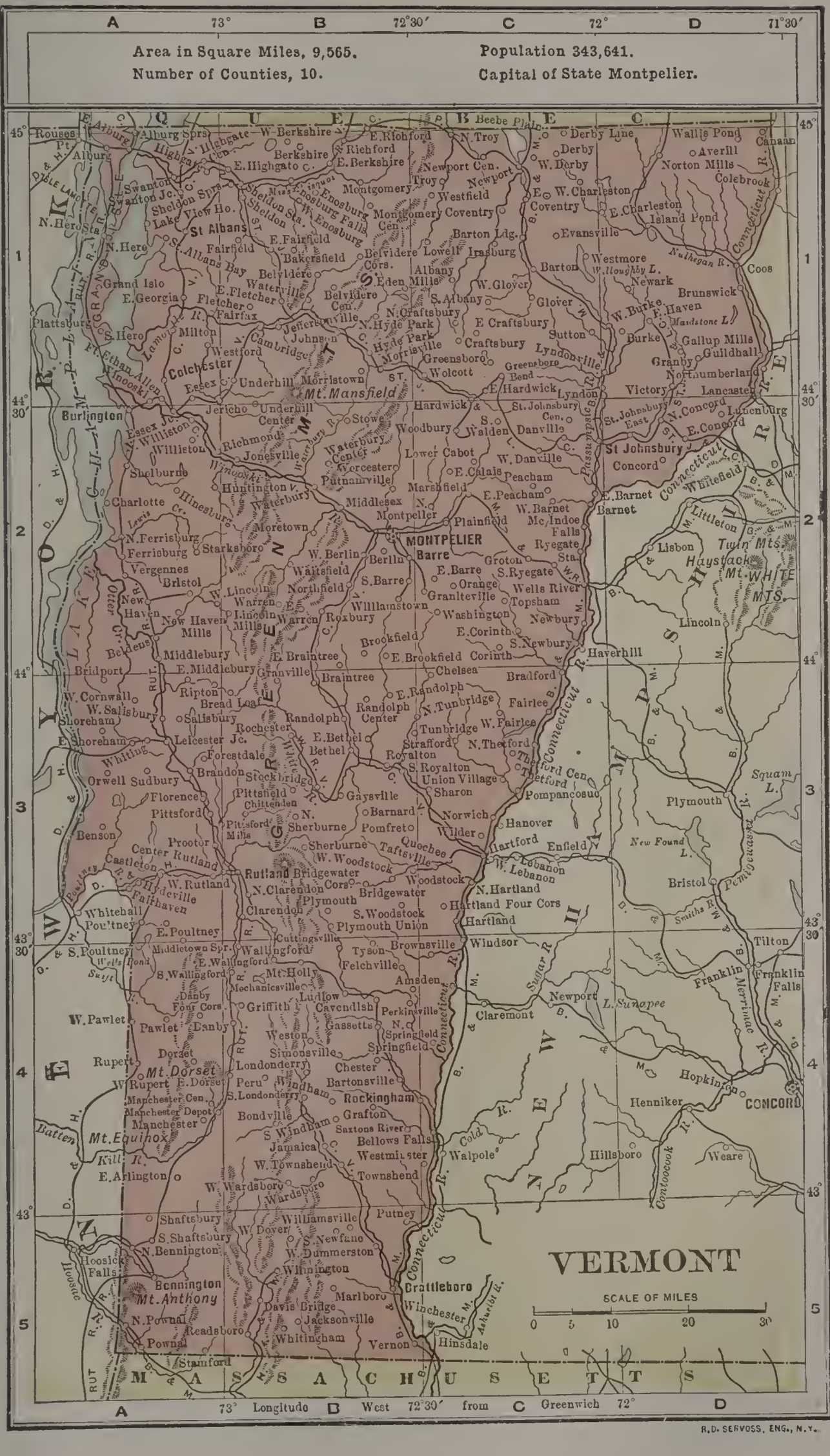
Climate.—The climate is exceedingly healthful, though subject to great extremes, the winters being long and cold, and the summers short, with brief spells of considerable heat. The mean annual temperature ranges from 40° in the n.e. to about 46° in the s. and s.w.; winter range at Burlington 18°—33°, sometimes falling to—10° or even—20°; summer 66°—71°, sometimes rising to 90°; average annual rainfall 48.60 inches.

Geology.—The surface rocks of the Green Mountains are not granitic, the entire range showing gneiss and schists with quartz rock in belts and crystalline limestone in beds. Drift appears in nearly all parts of the state, alluvial deposits appear along most of the streams, and Lower Silurian and Primordial rocks in the Champlain valley, with sea shells in the clay of the lake's banks. The economic properties are statuary, variegated, and veined marble; argillaceous slate; granite, syenite, and sandstone for building; soapstone; porcelain clay; freestone; whetstones; copper; manganese ore; chromic iron; lead; and some gold.—Vermont is particularly rich in timber, her forest growths including the sugar maple, hemlock, fir, spruce, pine, oak, hickory, beech, birch, elm, rock and red maple, butternut, basswood, tulip, cedar, and juniper. The soil generally is very fertile, and there are large tracts of nutritious grass-land, which support great herds of horses, cattle, and sheep.

Zoology.—Large game, like the moose, elk, black bear, panther, and deer, are becoming very scarce; small game are abundant; numerous aquatic birds frequent the large lakes; the birds of prey and song are those common to New England; and the fish, particularly in Lake Champlain, include the muskelunge, lake trout, white-fish, pickerel, roach, and perch.

Agriculture.—There are more than 35,000 farms in V., comprising over 5,000,000 acres, of which about half is improved land. The total value of all farm property, including land, buildings, and improvements, implements and machinery, and live stock is approximately $125,000,000. The principal crops are corn, wheat, oats, barley, rye, buckwheat, potatoes, hay, and tobacco. The production of wool is also important, as, too, are dairy products.

Manufactures.—There are nearly 2,000 establish-


A 73° B 72°30′ C 72° D 71°30′
Area in Square Miles, 9,565.
Number of Counties, 10.
Population 343,641.
Capital of State Montpelier.
VERMONT
SCALE OF MILES
0 5 10 20 30
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R.D. SERVOSS, ENG., N.Y.

ments, with aggregate products valued at over $75,000,000. The principal industries are butter and cheese; lumber aud timber products; marble and stone work; wool goods; monuments and tombstones; paper and wood pulp; flour and grist mills; foundry and machine shop products; lumber and planing mills; hosiery and knit goods; and cotton goods. Other important industries, almost as profitable, are patent medicines; agricultural implements; boots and shoes; boxes; brick and tile cars; clothing; carriages and wagons; confectionery; leather goods; mineral and soda waters; roofing materials; tobacco products; tools, etc.

Quarries and Mines.—Iron mines were once a source of profit, but have ceased to be generally operative since 1880. Slate quarries have been extensively worked since 1853, and in its output of this product V. ranks among the foremost states. Marbles of pre-eminent quality and beauty of colors abound, being enormously valuable. Granite, of which all known colors save red are found, is also extremely profitable. Among the state's other mineral resources are limestone, soapstone, talc, manganese, asbestos, mica, ocher, kaolin, and copper deposits.

Commerce and Transportation.—The total annual imports of V. amount to nearly $9,000,000, and the exports to nearly $15,000,000. The exports comprise lumber, brass and brass goods, brooms and brushes, cotton goods, perfumery and cosmetics, fish, glassware, hides and skins, rubber goods, etc. Lake Champlain and the Champlain canal provide an extensive waterway on the w., as does the Connecticut river on the e. There are about 1,100 miles of steam railway tracks, besides street electric railway systems.

Finance and Banking.—The total assessed valuation of property in the state, including both personal and are almost 70,000 pupils enrolled, with about 4,000 There are over 50 national banks, nearly 30 savings banks, and almost as many trust companies.

Education.—V. annually spends nearly $1,500,000 in the maintenance of its public schools, in which there are almost 70,000 pupils enrolled, with about 40,000 teachers. The most prominent institution for higher education is the University of V., connected with which are a medical department and an agricultural college. There are also many private secondary academies.

Religion.—There are altogether 25 different Christian religious bodies in V., with the Roman Catholics overwhelmingly predominating. The first legislature in 1778 provided for the observance of the "Lord's day." Church and state have, however, been kept distinctly separate, the nearest approach to any connection having occurred through the ultimate settlement of the "glebe lands" controversy in 1823, whereby V. annually pays about $3,000 to the Protestant Episcopal diocesan authorities.

Charities and Corrections.—The most important of

these includes a State prison, a house of correction, an industrial school, and a hospital for the insane. There are also many private and denominational charitable institutions.

State Government.—The form of government, adopted in 1777, succeeding that of town and associated committees of safety, was very democratic in character. The legislature consisted of one house, with a town representation therein, and these members were elected by the 'freemen' of the state. The executive authority was vested in a governor, lieutenant-governor, and twelve councillors, one duty of which was to review all bills before the representative body, and suggest amendments, prior to their final passage; but the negative power did not inhere in the 'governor and council.' With the modifications suggested by experience, this was the state government until 1836, when the present general assembly of two houses—senate and house of representatives—superseded the original form. The town system of government and representation in the legislature has been continued under the amended constitution. The senate is the popular body, based upon population by counties, and consists of 30 members; the house comprising 248 representatives of cities and towns. In 1850 county officers were first elected by the people; in 1870 the legislature changed to biennial terms. The 14 counties in Vermont were incorporated on the dates named: Bennington, and Windham, 1779, Feb. 11; Orange, Rutland, and Windsor, 1781, Feb. 22; Addison, 1785, Oct. 17; Chittenden, 1787, Oct. 22; Caledonia, Essex, Franklin, and Orleans, 1792, Nov. 5; Grand Isle, 1802, Nov. 9; Jefferson, 1810, Nov. 1—changed to Washington, 1814, Nov. 8; Lamoille, 1835, Oct. 26. The present constitution provides that state and county officers, members of the general assembly, justices of the peace, and representatives in congress, shall be elected, biennially, on the first Tuesday of September.

The successive governors, with their terms of service, are as follows: Moses Robinson 1789-90; Thomas Chittenden 1790-97; Isaac Tichenor 1797-1807; Israel Smith 1807-8; Isaac Tichenor 1808-9; Jonas Galusha 1809-13; Martin Chittenden 1813-15; Jonas Galusha 1815-20; Richard Skinner 1820-23; Cornelius P. Van Ness 1823-26; Ezra Butler 1826-28; Samuel C. Crafts 1828-31; William A. Palmer 1831-35; Silas A. Jenison 1835-41; Charles Paine 1841-43; John Mattocks 1843-4; William Slade 1844-46; Horace Eaton 1846-49; Carlos Collidge 1849-50; Charles K. Williams 1850-52; Erastus Fairbanks 1852-3; John S. Robinson 1853-4; Stephen Royce 1854-56; Ryland Fletcher 1856-58; Hiland Hall 1858-60; Erastus Fairbanks 1860-1; Frederick Holbrook 1861-63; John G. Smith 1863-65; Paul Dillingham 1865-67; John B. Page 1867-69; Peter T. Washburn 1869-70; John W. Stewart 1870-72; Julius Converse 1872-74; Asahel Peck 1874-76; Horace Fairbanks 1876-78; Redfield Proc

tor 1878-80; Roswell Farnham 1880-82; John L. Barstow 1882-84; Samuel E. Pingree 1884-86; E. J. Ormsbee 1886-88; William D. Dillingham 1888-90; Carroll S. Page 1890-92; Levi K. Fuller 1892-94; Urban A. Woodbury 1894-96; Josiah Grout 1896-98; Edward C. Smith 1898-1900; W. W. Stickney 1900-2; J. G. McCullough 1902-4; Chas. J. Bell 1904-6; Fletcher D. Proctor 1906-8; Geo. B. Prouty 1908-10; John A. Mead, 1910—.

History.—Vermont was discovered by Samuel de Champlain (q.v.) 1609, and was settled first by people from Massachusetts, who built Fort Dummer, on the site of Brattleborough, 1724. In 1731 a party of French Canadians began a settlement on the e. shore of Lake Champlain. Fort Dummer was the base of military operations against the French in the war of 1745, and after the second war, 1755-58, soldiers and others, who had become acquainted with the region during the wars, began to seek homes w. of the Conecticut river. As New Hampshire claimed jurisdiction over the territory, her governor, Benning Wentworth, issued grants of land to settlers in 138 townships, whence the region became known as the 'New Hampshire grants.' But the colony of New York also claimed jurisdiction, under grants from Charles II. to the duke of York. Both governors issued proclamations asserting their claims, and the governor of New York made several attempts to dispossess the settlers, but without success. On an appeal to the king the controversy was decided in favor of New York; but the 'Green Mountain boys' maintained a successful resistance to all attempts to eject them; and amid counter-proclamations and threats by the two governors, the struggle was kept up till the revolutionary war, when it was suspended for the greater struggle. Through the war, led by Ethan Allen, Seth Warner, Remember Baker, and other patriots, the people of Vermont performed feats of conspicuous gallantry and great public importance; they captured Fort Ticonderoga, and took part in the battles of Lake Champlain and the two engagements at Bennington. Meanwhile they were active in seeking to secure larger political rights. In 1776 they sought admission into the confederacy of the 13 colonies, but withdrew their petition in consequence of the opposition of New York. The following year they held a convention, declared themselves independent both in New York and New Hampshire, adopted a constitution and chose the present state name and renewed their application to the provincial congress for admission. It was not till 1781 that their petitions were seriously considered, and then the congress offered to admit them with a specified curtailment of territory. The proposition met general opposition and was refused. In 1790 New York revived the old question of its jurisdictional rights, and offered to abandon all claims to land in or jurisdiction over Vermont on the payment of $30,000. This proposition was accepted, and Vermont was admitted to the Union 1791,

Mar. 4. The constitution adopted 1777 was amended 1786, 1793, and 1870. During the war 1812-15, though the governor refused to call out the state troops and forbade them leaving the state, Vermont volunteers took part in the battle of Plattsburg, the naval action on Lake Champlain, and other engagements. In the Civil war Vermont furnished 33,288 men to the Union armies; St. Albans was raided 1864, Oct. 19, by a Confederate party from Canada; and it was the headquarters of a body of Fenians 1870, who were prevented by the United States authorities from making a raid into Canada. The state maintains prohibition of the liquor traffic; and compulsory education.

Population.—On June 18, 1761, was 22—the families of six actual settlers and landowners in Bennington. The temporary population of Fort Dummer (late in Massachusetts) had not been preserved. These pioneers had been increased, in 1791, to 43,970 on the east side, and 41,569 on the west side. In 1800 the population was 154,465; (1810) 217,895; (1820) 235,981; (1830) 280,652; (1840) 291,948; (1850) 314,120; (1860) 315,098; (1870) 330,551; (1880) 332,286; (1890) 332,422; (1900) 343,641; (1910) 355,956.

VERMONT, UNIVERSITY OF, and STATE AGRICULTURAL COLLEGE: located at Burlington, Vt. The University of Vermont was chartered in 1791, and first opened to students in 1800, the first class being graduated in 1804. The state made a grant of land of 29,000 acres for the use of the university, and the governor of the state and speaker of the house were made members *ex officio* of the board of trustees. In 1862 the Vermont Agricultural College was chartered, but as it did not receive the support necessary to put it into operation, it was incorporated in 1865 with the university under the title of the University of Vermont and State Agricultural College. Under this new charter the board of trustees consists of the governor, the president of the university, members *ex officio*, nine members elected by the state legislature, three every two years, for a term of six years, and nine other members having the power to fill vacancies in their number. The university also receives an annual state appropriation of $6,000. The medical department, which prior to 1899 was a partially independent affiliated school, is one of the oldest medical schools in the United States, having been opened to students as early as 1809. It was suspended from 1836 to 1854, but after the latter date its growth was continuous, and in 1899 it became an integral part of the university under the entire control of the board of trustees. The university has maintained a steady growth from the first, except during the war of 1812, and the Civil war. In 1814-15 the college buildings were used as barracks, and all exercises were suspended; in the Civil war large numbers of students left the university to join the army. There are 56 en-

dowed scholarships, 30 state scholarships, and a students' loan fund. The university buildings on the campus include Old College, a reconstruction of a building erected 1825, the corner-stone of whose southern part was laid by Gen. Lafayette; Converse Hall, a dormitory; Grassmount, woman's dormitory; the Billings Library; the Williams Science Hall; the mechanical buildings; the agricultural buildings; and the gymnasium; the medical department occupies buildings in the city. The library in 1904 contained 67,812 volumes. In 1904, in which year the centennial of the first graduation was celebrated, a movement was begun by the alumni to raise a centennial endowment fund of $1,000,000. The students in 1904 numbered 566, of whom 341 were in the departments of arts and sciences. Among the graduates have been one vice-president of the United States, one cabinet minister, three United States ministers to foreign nations, four governors of Vermont, and 14 college presidents.

VERNACULAR, a. *vėr-năk'ū-lėr* [L. *vernac'ŭlus,* vernacular, indigenous—from *verna,* a home-born slave]: native; peculiar to the person by birth or nature; belonging to the country of one's birth: N. the language or peculiar idiom of any place. VERNAC'ULARLY, ad. *-lĭ.* VERNAC'ULOUS, a. *-lŭs,* in *OE.,* vernacular.

VERNAL, a. *vėr'năl* [L. *vernālis,* of or pertaining to spring—from *ver,* the season of spring]: belonging to the spring; appearing in spring; belonging to youth. VER'NALLY, ad. *-lĭ.* VERNA'TION, n. *-nā'shŭn,* in *bot.,* prefoliation; the arrangement of the leaves in the leaf-bud; corresponding to ÆSTIVATION (q.v.) in the flower-bud. There are great differences in the vernation of plants, and these differences are characteristic not only of species but of genera, and even of natural orders; but the vernation of the same species is always the same. VER'NANT, a. *-nănt,* in *OE.,* flourishing, as in spring. VERNAL EQUINOX, with respect to the northern hemisphere, the period when the sun crosses from the s. to the n. of the equinoctial, about Mar. 21 (see EQUINOX). VERNAL-GRASS, a common meadow grass; spring-grass; the *Anthoxanthum odorātum,* common in Great Britain and throughout Europe, and naturalized in the United States.

VERNE, *vĕrn,* JULES: writer of pseudo-scientific romances: b. Nantes, France, 1828, Feb. 8; d. 1905, Mar. 24. His first comedy, *Pailles Rompues,* was produced 1850; it was followed by *Onze Jours de Siège; L'Oncle d'Amĕrique;* and several comic operas. These had great success in Paris; but Verne's fame rests chiefly on his long series of mock-scientific extravaganzas, beginning with *Five Weeks in a Balloon,* 1863. Prior to 1892 the list of these romances comprised nearly 60 separate stories, of which more than 30 have been translated into English and published in large editions in England and the United States. The titles of a few are: *Journey to the Centre of the Earth; Twenty Thousand Leagues Un-*

der the **Sea; From** *Earth to Moon; The English at the* ***North Pole; Dr.*** *Ox's Experiments; Michael Strogoff;* ***Hector Servadac;*** *Dick Sands; Mathias Sandorf;* ***Purchase of the North Pole.*** After his fame as a writer had become well established, Verne entered into a contract with a Parisian publisher to write two stories per annum, at $2,000 a story, and this income, supplemented by occasional valuable gifts, enabled him to live in cultured ease at Amiens, where he became a municipal councilor, and where he died. *The Master of the World,* and *A Drama in Livonia,* published in 1905, completed a list of over 100 romances from his pen; and many of his creations, which were regarded at the time as extravagant fancies of an imaginative mind, became realities during his lifetime. Among these may be mentioned the mile-a-minute railroad train and the fast steamship in *Around the World in Eighty Days;* the automobile in *The Steam House;* the dirigible balloon in *Hector Servadac* and *Robur le Conquerant,* and the submarine boat in *Twenty Thousand Leagues Under the Sea.*

VERNET, *vĕr-nā'*, Antoine Charles Horace (popularly known as Carle V.): French painter of battle-pieces, hunting-pieces, etc.: 1758-1835, Nov. 17; b. Bordeaux; son of Claude Joseph Vernet (q.v.). He received his education at the Academy of Paris, where 1782 he gained the chief prize, which brought the privilege of studying for some years in Rome. On his return his success in Paris was great; he achieved the highest honors of his profession, became chevalier of the order of St. Michel and of the Legion d'Honneur. He was renowned especially as a painter of horses; but his chief works were battle-pieces on a large scale, chiefly commemorative of the triumphs of Napoleon. The principal are: *The Battle of Marengo, The Morning of Austerlitz, The Emperor Giving Orders to His Marshals, The Bombardment of Madrid, Battle of Rivoli, Entrance of Napoleon Into Milan,* and *Battle of Wagram.*

VERNET', Claude Joseph: French painter: 1714, Aug. 14—1789, Dec. 3; b. Avignon; son of Antoine Vernet, also a painter. He went at the age of 18 to Italy, and remained there 20 years, much of the time in struggle and privation. At last (1752) his reputation as a landscape and marine painter had become so high that he was invited to Paris by Louis XV., who assigned him apartments in the Louvre. He painted an immense number of pictures. One of his chief undertakings was a series of 15 large pieces commissioned by the government, representing the chief seaports of France. These are in the Louvre, with many others of his best works. His pictures were reproduced by numerous engravers. 'Perhaps no other painter of landscapes or sea-pieces has ever made the human figure so completely a part of the scene depicted, or so important a factor in his de-

sign.', He married at Rome an English lady, a Miss Parker. He died in Paris.

VERNET', EMILE JEAN HORACE: French military painter: 1789, June 30—1863, Jan. 17; b. Paris; son of Antoine Charles Horace Vernet (q.v.). His youth was passed amid the tumults and anarchy of the Revolution; and his general education was irregular and incomplete; but he had a hereditary artistic gift, and was instructed by his father. He married, and began his career as a painter, at the age of 20. The *rôle* which he chose was that suggested at once by his father's success and by the military intoxication of the Parisian public. Young as he was, he had served as a soldier. Departing from the old conventional and imaginative treatment of military scenes, he presented the visible fact—thereby perhaps suffering loss in 'composition' and in deep suggestiveness; but gaining in fidelity and closeness of mere representation of the halt, the bivouac, or the battle. The success of this mode—a mode whose full meaning could be grasped by all observers—was brilliant and instantaneous; his first pictures of the kind—*The Dog of the Regiment and the Horse of the Trumpet, Capture of the Redoubt, Halt of French Soldiers,* etc.—being received with enthusiasm of favor accorded to no other artist. In 1812 the first-class medal was awarded to him; and 1814 the emperor conferred on him the title chevalier of the Legion d'Honneur. The favor which he received from the emperor, whose victories he signalized on his canvas, was continued to him by the restored dynasty, whose sympathy with these favorite subjects (which, as occasion served, he continued to paint) could hardly be supposed to be unqualified. By Charles X. he was made officer of the Legion d'Honneur 1825; and he was elected member of the Institute 1826. In 1827 he was appointed director of the French Academy at Rome, whither he went to reside for several years; and on the withdrawal of the French legation, occasioned by the revolution of 1830, he was appointed to act as representative of his country at the Roman court. One of Vernet's most gigantic undertakings, the grand series of paintings decorating the Constantine Gallery at Versailles, commemorative of the triumphs of the French arms in Algeria, was prescribed to him by Louis Philippe, and was executed in the brief space of three years. In pursuance of this object, he more than once visited Algeria. To the last, honors flowed upon him: in 1842 he was made commander of the Legion d'Honneur; in the Universal Exposition of 1855 the grand medal of honor was awarded to him. Besides military pieces, Vernet painted many others—e.g., *School of Raphael, Judith and Holofernes.* With amazing facility, like that which pertains to the most brilliant off-hand sketch, Vernet combines a surprising vigor, movement, and fiery effect.

VERNICOSE, a. *vėr'nĭ-kōs* [mid. L. *vernix*, varnish (see VARNISH)]: in *bot.*, having a natural varnish.

VERNIER, n. *vėr'nĭ-ėr* [after the inventor, Pierre *Vernier* (b. Burgundy about 1580; d. 1637), who gave a description of it in a pamphlet published Brussels 1631]: an index which slides along the graduated scale or limb of an instrument, used for measuring minute fractional parts of the smallest spaces of the fixed scale. The principle of the Vernier is essentially as follows: AB (fig. 1) is a portion of the graduated scale of an instru-

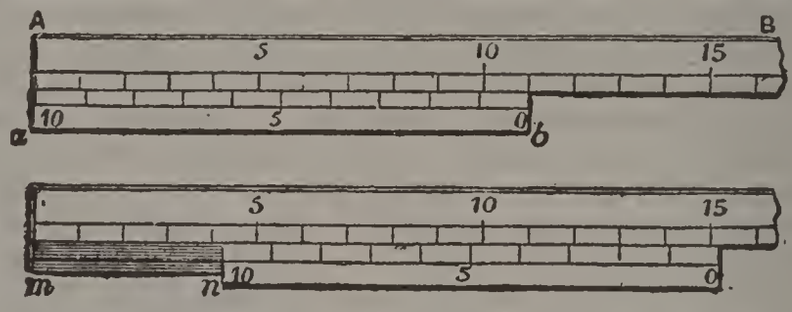


Fig. 1.

ment showing divisions and subdivisions; *ab*, a small scale (the *vernier*), made to slide along the edge of the other and so divided that *ten* of its subdivisions are equal to *eleven* of the smallest divisions of the scale AB; then each division of the vernier is equivalent to $1\frac{1}{10}$ of a subdivision of AB; consequently, if the zero-point of the vernier be (fig. 1, A) opposite 11 on AB, the 1 on the vernier is at $9\frac{9}{10}$ ($1\frac{1}{10}$ below 11), 2 on vernier is at $8\frac{8}{10}$ ($2\frac{3}{10}$ below 11), etc. Also, if the vernier be slid along so that 1 on it coincides with a division on the scale, then 0 on the vernier is *one*-tenth above the next division on the scale; if 4 on the vernier coincide with a division on the scale, the 0 of the vernier is *four*-tenths above a division. The vernier is applied to instruments by being carried at the extremity of the index-limb, the zero on the vernier being taken as the index-point; and when the reading-off is to be performed, the position of the zero-point, with reference to the divisions of the scale, gives the result as correctly as the mechanical graduation by itself permits, and the number of the division of the vernier which coincides with a division of the scale, supplements this result by the addition of a fractional part of the smallest subdivision of the scale. Thus (fig. 1, B), suppose the scale-divisions to be degrees, then the reading by the graduation alone gives only a result between 15° and 16°; but as the 2d division of the vernier coincides with a graduation on the scale, it follows that the zero-point is $\frac{2}{10}$ of a division above 15°, and that, therefore, the correct reading is 15° .2. It will be at once seen that by merely increasing the size of the vernier, e.g., making 20 divisions of it coincide with 21 on the scale, the latter may be read off to $\frac{1}{20}$ths; and a still greater increase in the size of the vernier would secure further accuracy.

In the more recently constructed astronomical and geodesical instruments, a vernier is employed which has one graduation *more* (fig. 2) than the corresponding portion of the scale. A little consideration will show that the only effect of this modification is to enable the ver-

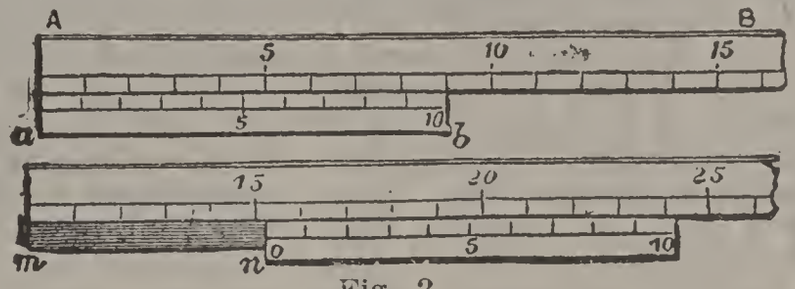


Fig. 2.

nier to be graduated toward the same direction as the scale, and thus save a little confusion in the reading off. In small instruments, or where the utmost accuracy is required, a small magnifying lens is fixed over the vernier to enable the observer, in cases where no two graduations coincide (which is usually the case), to estimate the amount of error introduced by assuming that the two graduations which approach nearest to coincidence actually coincide.

Of the various methods for subdivision in use before the introduction of the vernier, the most important were the *Diagonal Scale* (q.v) and the *Nonius*. The latter, so called from its inventor, Petrus Nonius (Pedro Nunez), Portuguese mathematician, who described it in a treatise *De Crepusculis Olyssipone* (1542), consists of 45 concentric circles described on the limb, and divided into quadrants by two diameters intersecting at right angles. The outermost of these quadrants was divided into 90, the next into 89, the third into 88, etc., and the last into 46 equal parts, giving on the whole a quadrantal division into 2,532 separate and unequal parts (amounting on an average to about 2′ intervals). The edge of the bar which carried the sights passed, when produced, through the centre; and served, consequently, as an index-limb; and whichever of the 45 circles it crossed at a graduation, on that circle was the angle read off; e.g., if it cut the 7th circle from the outside at its 43d graduation, the angle was read off as $\frac{43}{84}$ of 90°, or 46° 4′ $17\frac{1}{7}$″.

VERNON, Conn.: town in Tolland co.; on the New York, New Haven and Hartford railroad; about 12 m. e. b. n. of Hartford. Included in the town are the city of Rockville, and the villages of Talcottville and Vernon. It is in an agricultural region, and has considerable manufacturing interests. In 1900 (government census) there were 123 manufacturing establishments with a capital of $5,743,445. In the manufactories were 2,449 employes to whom were paid annually $928,886. The value of the yearly output was $5,499,418. The chief manufactures are silk, cotton, and woolen goods. The

dairy and farm products shipped from the town are quite extensive. Pop. (1900) 8,483; (1910) 9,087.

VERNON, *vėr'non*, EDWARD: British naval officer: 1684, Nov. 12—1757, Oct. 29; b. Westminster, England. He was educated at Westminster School and Oxford; obtained a commission in the navy 1702, and that year was with the fleet under Admiral Hobson, which destroyed the allied French and Spanish fleets at Vigo. He was rear-admiral in active service 1708-27, and then he entered parliament. Having in a speech censuring the government declared that Puerto Bello might be taken with 6 ships, his assertion was at once put to the test by his assignment to the command of 6 men-of-war, with the rank of vice-admiral of the blue: he took Puerto Bello 1739, Nov. 22, after an assault lasting one day, his loss being only 7 men. He then bombarded and destroyed Fort Chagres on the Isthmus of Darien. In 1741, Jan., he sailed from Jamaica with a great fleet (29 ships of the line, 80 smaller vessels, 15,000 sailors, 12,000 soldiers), and after cruising in search of Spanish and French vessels, attacked Cartagena, the most strongly fortified port of Spanish America, but was repulsed with great loss: furthermore a pestilence visited his ships. He became admiral 1745; but 1746, Apr. 11, he was cashiered on account of a quarrel with the naval authorities. Smollett, the novelist, was in the Cartagena expedition, and describes the assault in *Roderick Random*. So was George Washington's brother, Lawrence, who named his estate in Virginia Mount Vernon, in honor of the admiral.

VERNON, GEORGE JOHN WARREN, fifth baron: English scholar and philanthropist: b. Stapleford, Nottinghamshire, 1803, June 23; d. near Derby, England, 1866, May 31. He was one of the wealthiest men in England, and devoted his life to the service of letters, philanthropy, and reform. He entered public life in 1831 as member of parliament for Derby and was an active supporter of the reform bill. In 1835 he succeeded to the title of his father and his seat in the house of lords, honors which hampered in some degree his political career, though he remained liberal in sentiment and a progressive and public spirited citizen to the last. His labors as a philanthropist during the cotton famine in Lancashire in 1862-3 made him much beloved, his generosity and personal exertions doing much to alleviate the widespread distress of that period.

VERNON-HARCOURT, LEVESON FRANCIS: English civil engineer: b. London 1839, Jan. 25. He was educated at Oxford, and studied under Sir John Hawkshaw in 1862-5, later becoming his assistant. He engaged in engineering on various water works and railways, went to London in 1875, where he established himself as a hydraulic engineer, and is generally recognized as an expert in his profession. He visited India in 1896

to make an inspection of the River Hûgli, was British member of the jury for civil engineering at the Paris exposition in 1900, and since 1882 has occupied the chair of civil engineering at University College, London. He has published: *Rivers and Canals* (1882); *Achievements in Engineering* (1891); *Civil Engineering as Applied in Construction* (1902).

VERONA, *vā-rō'nâ:* ancient and interesting city of n. Italy, in Venetia; on a plain at the foot of the hills which lie at the base of the Tyrolese mountains, 72 m. w. of Venice by railway; on the Adige, by which it is divided into two unequal parts connected by four bridges. The aspect of the town, and the rich landscape around, is considered remarkably fine. Verona is a fortress of the first rank, a member of the famous Quadrilateral, and has always been considered a place of strength since it was surrounded with walls by Emperor Gallienus, 265. Its modern fortifications are among the most extraordinary works of military engineering in Europe: a circle of forts extends far outside the ancient walls. After passing into the hands of the Austrians 1815, it was greatly strengthened; and after 1849 they made every effort to render it impregnable.—Of its many interesting edifices, the chief is the amphitheatre, built, it is supposed, between A.D. 81 and 117. The building has been wonderfully preserved, the interior being still apparently in full preservation. The lesser diameter of the building is 404 ft., that of the arena 146 ft.; and the edifice is calculated to have accommodated 22,000 people. This, as well as many other structures of the city, has a handsome appearance, having been built of Verona marble. The Porta del Borsari and the Arco dei Leoni are fine Roman gateways, both of the imperial age. The streets of Verona are wide, especially the Corso; there are four principal squares, of which the Piazza dei Signori contains the palace of the Della Scala and the superb Palazzo del Consiglio, whose façade is adorned with bronze and marble statues of celebrated natives of Verona, including Catullus, Pliny the Younger, etc. The picture gallery contains about 400 specimens, including a Transfiguration by Titian, and a full-length portrait and a Deposition by Paul Veronese. The cathedral, of uncertain date, but attributed to Charlemagne, has a handsome porch guarded by the celebrated paladins, Roland and Oliver. The more modern parts of the cathedral are exceedingly rich; among other excellent works of art, it contains a famous Assumption by Titian. There are about 40 churches, many of them beautiful specimens of Gothic architecture, and containing valuable paintings and other art treasures. The palaces also are numerous and fine; and there are several theatres, hospitals, etc. Manufactures of woolen goods, hats, cotton, silk, hemp, and hosiery are carried on; and the town trades with Venice in garlic sausages. Excellent cattle are

reared on the rich pasturage of the vicinity. Wines and fruit are good and abundant.

The early history of Verona is involved in obscurity, and there is difficulty in determining whether it belonged originally to the Euganei or the Cenomani. It afterward fell into the hands of the Romans, and under the Empire became one of the most flourishing cities in n. Italy. Constantine took it by assault 312; Stilicho defeated the Goths here 402. Charlemagne took possession of it, and made it the royal residence of his son, King Pepin. The Montagues, who were Ghibellines, lived here in perpetual and deadily enmity with the Guelf Capulets; and from the contentions between these families, Shakespeare—drawing on an Italian authority—derived materials for his tragedy of *Romeo and Juliet*. In 1259 the town received Mastino della Scala as its ruler. In 1405 the city gave itself over to Venice, to free itself from its tyrants, who were alternately of the Scala, the Visconti, or the Carrara families. It has since shared the vicissitudes of the rest of Venetia, and 1866 was ceded to the kingdom of Italy. Pop. (1901) 74,271.

VERONA, Pa.: borough, Allegheny co.; on the Allegheny river and the Allegheny Valley railroad; about 10 m. n.e. of Pittsburg. It has a number of manufacturing establishments, chief of which are glass works, foundries, machine shops, and powder and dynamite works. It has a national bank which has a capital of $50,000, deposits amounting to $194,000, and loans and discounts, stocks, and securities to the amount of $259,800. Pop. (est.) 2,000.

VERONESE, Paul. See Cagliari, Paolo.

VERONICA, n. *vē-rŏn'ĭ-ka* [It. and Sp. *veronica:* F. *véronique*]: extensive genus of plants, whose hardy herbaceous species are admirably adapted for ornamenting flower-borders, ord. *Scrophularĭācĕæ*. See Speedwell.

VERONICA, Saint: a woman who, when Christ was carrying his cross, lent him her veil to wipe the sweat from his face, and on receiving it back found his likeness imprinted on the cloth. This veil is said to be still preserved at Rome, where it is shown to only a few persons of special rank. It is commonly supposed that the Saint Veronica of the legend received this name in mistake, and that it arose from a misunderstanding and corruption of the term *vera icon*, true image, originally applied to the likeness itself. Various ancient witnesses, however, have identified Veronica with different persons mentioned in the Gospels. In the legend of the Clementines, Veronica is another form for Berenice, the daughter of the Canaanitish woman who won from Jesus the recovery of her child. According to the *Acts of Pilatus*, and in the writings of Cassiodorus, Reginus, Cedrenus, etc., she was the woman healed by Christ of her issue, who afterward raised to Jesus a statue in bronze at

Paneas. Consult Grimm, *Die Sage von den Christusbildern* (1842).

VERPLANCK, *vĕr-plăngk'*, GULIAN CROMMELIN, LL.D.: author: 1786, Aug. 6—1870, Mar. 18; b. New York. Having graduated at Columbia 1801, he studied law and was admitted to practice; but soon went to Europe and there spent several years. He entered the New York legislature 1820; was professor of evidences of revealed religion in the Protestant Episcopal Seminary, New York, 1821-25; then was representative in congress till 1833, when he entered the New York senate and was senator till 1841. He was vice-chancellor of the New York University 1855 till his death. He published *The Bucktail Bards,* a series of political satires directed against DeWitt Clinton, mayor of New York; *Essays on the Various Evidences of Revealed Religion; Doctrine of Contracts; Shakespeare's Plays;* also several occasional essays, orations, etc. With William Cullen Bryant and Robert C. Sands, Verplanck edited for 3 years an annual named *The Talisman.*

VERRES, *vĕr'rēz,* CAIUS: Roman pretor and governor, noted for arrogance, cruelty, and extortion; about B.C. 112-43. After serving as pretor at Rome, he was sent to govern Sicily, one of the richest and most prosperous Roman provinces. Thoroughly roused at the end of three years of his hind-handed administration the Sicilians, having secured the powerful aid of Cicero, succeeded in bringing him to trial. He was defended by Hortensius, but before the close of the trial, after hearing the first of Cicero's orations against him, Verres fled from Rome, carrying his plunder with him. He settled in Gaul near Marseilles. He was killed by the soldiers of Antony, his wealth, it is said, having excited Antony's avarice.

VERROCCHIO, ANDREA DEL: Italian artist: b. Florence 1435; d. Venice 1488. He began as a goldsmith; was also a follower of Donatello in the practice of sculpture and eventually devoted himself to painting. He was as skilful in marble as in bronze work, and his sculptures at Florence are distinguished for lifelike expression and strong, truthful individuality. His best works are: *The Boy and the Dolphin,* a group on the fountain in the court of the Palazzo Vecchio; *Madonna and Child,* a relief; *David,* a bronze statue; *Death of the Wife of Francesco Tornabuoni,* in the Bargello; and *Doubting Thomas.* Going to Venice in 1480 he began the colossal statue of Bartholommeo Colleoni, which was completed by Leopardi. In the Academy at Florence is his *Baptism of Christ,* in which one of the angels is said to have been painted by Leonardo da Vinci. There are two other pictures, Madonnas, ascribed to him, one of which is in the Museum at Berlin.

VERRUCA, n. *vĕr-rū-kă,* plu. VERRUCÆ, *vĕr-rū'sē* [L. *verrūca,* a wart, an excrescence; *verrūcæ,* warts]: a wart: in *bot.,* in the plural, collections of thickened cells on the

surface of plants, assuming a rounded form, and containing starch and other matters. VERRU'CIFORM, a. *-sĭ-fawrm* [L. *forma*, shape]: shaped like a wart or warts. VERRUCOSE, a. *vĕr'rū-kōs*, or VER'RUCOUS, a. *-kŭs* [L. *verrucōsus*, warty, rugged]: warty; in *bot.*, covered with wart-like excrescences. VERRUCULOSE, a. *vĕr-rū'kū-lōs*, having minute wart-like prominences.

VERRUGAS, Peru: a streamlet and ravine in the mountains of central Peru, spanned by a lofty viaduct of the Lima & Oroya railway. The viaduct, with two piers, is 575 feet long and 252 feet high; it was completed in 1891 and replaced a similar construction with three piers opened in 1873 and destroyed by a flood in 1889.

VERSAILLES (Fr. *vĕr-sa-y*), France: capital of the department of Seine-et-Oise, 11 m. s.w. of Paris, is a town of royal construction, having risen up rapidly, regularly, and with great magnificence under the directions of the sovereigns of France, particularly Louis XIV., who made it the seat of his court, and lavished immense sums on its embellishment. It is justly regarded as one of the handsomest towns in Europe. The palace is the most conspicuous edifice, though somewhat monotonous in appearance. It was built by Louis XIV., but ceased to be a royal palace at the revolution of 1793, and Louis Philippe converted it into a national museum. It is filled with an immense collection of statues and paintings intended to represent all the principal personages and events connected with French history from Clovis downward. The principal façade bearing the inscription, *A toutes les gloires de la France* ('To all the glories of France'), and fronting the garden and park, is over 400 yards long. The park, both in extent and embellishment a fit accompaniment of the palace, attracts crowds of visitors, the *eaux*, or fountains, when in play being specially attractive features. The palaces of the Grand and Petit Trianon are in the north of the park. The treaty of peace between Great Britain and the United States was signed at Versailles in 1783. Versailles was the German headquarters during the Franco-German war from 1870-1, Sept.-Mar., and the seat of the French government from the peace till 1879. Pop. (1901) 54,081.

VERSAILLES: Ky.; town, county-seat of Woodford co.; on the Louisville & A. and the Southern railroads; 14 m. s.e. of Frankfort. It is in an agricultural region in which considerable attention is given to stock-raising. The industries are connected chiefly with the farm products. The educational institutions are Ashland Seminary (P. E.), Rose Hill Seminary (Christian), opened in 1875, and public elementary schools. The three banks have a combined capital of $120,000 and deposits amounting to $513,320. Pop. 2,500.

VERSAILLES: Mo.; town, county-seat of Morgan co.; on the Missouri Pacific railroad; about 38 m. s.w. of Jefferson City. It is in an agricultural region, and in the vicinity are valuable deposits of iron, kaolin, copper, and lead. There are near-by large fields of bituminous coal. The products of the mines contribute largely to the prosperity of the town. There are two banks with a combined capital of $85,000 and deposits amounting to $255,430. The high school was established in 1894. Pop. 1,500.

VERSAILLES: Ohio; village in Darke co.; on the Cincinnati, H. & D. and the Cleveland, C., C. & St. L. railroads; about 40 m. n.w. of Dayton. It is in a farming section in which considerable attention is given to stock-raising. The chief manufacturing establishments are a flour mill, machine shop, and creameries. The educational institutions are Saint Dennis Academy (R. C.), a public high school, founded in 1884, public and parish schools, and a public library. There are two private banks which have a combined capital of $49,000 and deposits amounting to $260,000. Pop. (1890) 1,385; (1900) 1,478; (1910) 1,580.

VERSAL, a. *vėr'săl:* in *OE.*, universal.

VERSANT, a. *vėr'sănt* [L. *verso*, I transact]: familiar; conversant.

VERSATILE, a. *vėr'să-tĭl* [F. *versatile*, versatile—from L. *versātĭlis*, that turns round, movable—from *versārĕ*, to turn much or often, frequentative of *vertĕrĕ*, to turn]: that can be turned round; changeable; unsteady; easily turned from one thing to another; turning with ease from one thing or occupation to another; easily applied to a new task, or to various subjects, as a man of *versatile* genius; in *bot.*, attached by one point to the filament, and hence very easily turned round, as an anther. VER'SATILELY, ad. *-lĭ.* VER'SATILENESS, n. *-tĭl-nĕs*, versatility. VER'SATIL'ITY, n. *-tĭl'ĭ-tĭ*, aptness to change, the faculty of turning easily from one occupation, pursuit, task, or subject to another.

VERSCHAFFELTIA, n. *vėr'shăf-fĕl'tĭ-ă* [*Verschaffelt*, a Dutch botanist]: a genus of the ord *Palmācĕæ*, comprising the species *V. splendĭda*, one of the most majestic palms in cultivation, densely clothed with long, sharp spines, and having the fronds broad and entire.

VERSE, n. *vėrs* [F. *vers*, a verse—from L. *versus*, a turning, a line—from *vertĕrĕ*, to turn: It. *verso*]: a line in poetry, containing a certain number of measured syllables (see METER; RIME): *popularly*, four lines or a stanza of a piece of poetry: poetical and metrical composition; poetry: in *Scrip.*, a short division of a chapter; a similar division in any book: V. in *OE.*, to tell or compose in verse; to relate poetically. VERS'ING, imp. VERSED, pp. *vėrst.* VERSIFY, v. *vėr'sĭ-fī* [L. *versus*, a verse; *facĭō*, I make]: to form or turn into verse; to

relate or describe in verse. VER'SIFYING, imp. VER'SIFIED, pp. *-fīd.* VER'SIFIER, n. *-fī-ėr,* one who versifies or turns into verse; a rhymer. VER'SIFICA'TION, n. *-fĭ-kā'shŭn* [F. —L.]: the art or practice of composing verse or poetry. VER'SIFICA'TOR, n. *-tėr,* one who versifies. VERSICULAR, a. *vėr-sĭk'ū-lėr,* of or pertaining to verse or verses. BLANK VERSE, poetry in which the lines do not rhyme with each other. HEROIC VERSE: see under HERO.

VERSED, a. *vėrst* [L. *versus,* pp. of *vertĕrĕ,* to turn]: with *in,* well skilled; thoroughly acquainted; conversant with. VERSED SINE, or VERSINE, *vėr'sīn.* See SINE.

VERSICOLORED, a. *vėr'sĭ-kŭl'ėrd* [L. *versicŏlor,* of various colors—from *versārĕ,* to change, and *color,* color]: changeable in color; many-colored; also VERSICOLOR.

VERSIFY, VERSIFIER, VERSIFICATION. See under VERSE.

VERSION, n. *vėr'shŭn* [F. *version*—from mid. L. *versĭō* or *versĭōnem,* a version—from L. *versus,* pp. of *vertĕrĕ,* to turn: It. *versione,* a version]: a translation or rendering of a book or passage from another language; that which is rendered or translated from another language; specially applied to translations of the Scriptures, e.g., *Septuagint Version; Revised Version* (see BIBLE): an account; a statement: in *OE.,* a change.

VERST, n. *vėrst* [Russ. *versta*]: a Russian mile, equal to 3,500 English feet or about two-thirds of an English mile; spelled also WERST.

VERSUS, prep. *vėr'sŭs* [L. *versus,* toward, turned in the direction of—from *vertĕrē,* to turn]: against—chiefly used in legal language, and contracted into *v.*

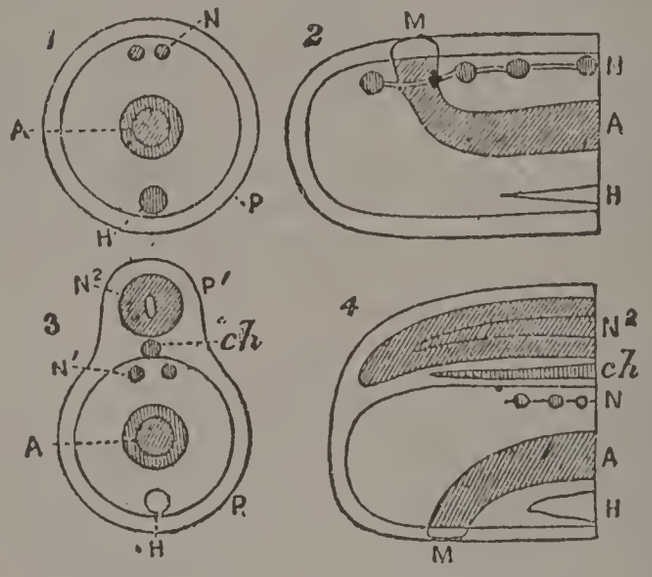
VERTEBRA, n. *vėr'tĕ-bră,* VER'TEBRÆ, n. plu. *-brē* [L. *vertĕbra,* a joint—from *verto,* I turn]: a single bone of the backbone or spinal column of an animal, so named from its moving upon the adjoining one; one of the bones forming the spine; the different *vertebræ* are usually divided into *cervical,* or those of the neck; *dorsal,* or those of the back; *lumbar* and *sacral,* or those of the loins; and *caudal,* or those of the tail (see SPINAL COLUMN; SKELETON). VER'TEBRAL, a. -brat, pertaining to the vertebræ or joints of the spine or backbone; having a backbone: N. an animal having a backbone. VER'TEBRE, n. *-bėr,* in *OE.,* a single bone of the backbone; a vertebra. VERTEBRATE, n. *vėr'tĕ-brāt,* or VERTEBRATED, a. *vėr'tē-brā-tĕd,* having a backbone or vertebral column; in *bot.,* applied to leaves which are contracted at intervals, there being an articulation at each contraction. VER'TEBRATE, n. an animal having a backbone. VERTEBRATA, n. plu. *vėr'tē-brā'ta,* the division of the animal kingdom characterized by the possession of a backbone or vertebræ. VERTEBRA DENTATA, *dĕn-tā'tă* [L. *dentātus,* toothed—from *dens,* a tooth]: the second vertebra or axis, forming a pivot on which the head with the first vertebra or atlas rotates.

VERTEBRATA, *vėr'tē-brā'ta:* highest and most important of the animal sub-kingdoms, containing all animals which have a backbone composed of a varying number of small bones called vertebræ (see SKELETON· SPINAL COLUMN), which composite backbone serves at once for general support of the other parts, and for protection of the central part of the nervous system (the brain and spinal cord) in a closed cavity in the interior.

We notice first the developmental, then the structural peculiarities of the vertebrates. Like the members of the other sub-kingdoms, the vertebrates begin in a semi-fluid nitrogenous substance called plasma, which separates itself (or differentiates, as it is scientifically termed) into albumen, fibrin, primary membrane (the lemma of Owen), nuclei, and cells, in which form, says the above-named physiologist, 'the individuality of the new organism first dawns as a nucleated germ-cell, or germinal vesicle.' The formation of yolk by the evolution of albuminous granules and oil-particles from the plasma, and the development of an outer layer of membrane, complete the unimpregnated egg. For further development, another principle, the spermatozoon, or product of the sperm-cell, is required. Its reception by the egg is followed by the formation of a germ-mass, which is formed by consecutive divisions, cleavages, or segmentations of the impregnated centre, which incorporates more or less of the yolk. Thus far there is no difference between the vertebrate and the invertebrate germ. The next step, to use the words of Prof. Owen, 'impresses upon the nascent being its *vertebrate* type.' The parietal portion of the germ becomes raised up on each side into a ridge, so that a long groove or furrow is formed between these parallel ridges; and the margins of these subsequently uniting with one another, constitute a tube, in the interior of which the vertebrate cerebro-spinal nervous centres are developed. In the mean time, the margins of the germs extend downward over the yolk till they meet and form the abdominal cavity. Hence, in the vertebrates, there are developed from the *chordæ dorsalis*, or *notochord* (see DEVELOPMENT OF THE EMBRYO) 'a pair of plates "neurad," * to inclose the nervous axis; and a pair of plates "hæmad," † to inclose the vascular axis and organs of vegetative life. Flesh and skin co-extend with the inclosing plates. This formation of two distinct parallel cavities—neural and hæmal—under symmetrical guidance, in the vertical or "neuro-hæmal" direction, with a repetition of parts on the right and left sides, establishing transverse or "bilateral" symmetry, constitutes the chief developmental characteristics of the vertebrate animal.'—Owen's *Anatomy of Vertebrates*, I. The accompanying diagrams, from Prof. Huxley's *Elements of Comparative Anatomy*, may illustrate this subject. In the invertebrates, merely a single saccular or tubular investment is formed, which incloses all the viscera; so that, provided we select one ranking high enough to possess a

* Backward in man, upward in beasts.
† Forward in man, downward in beasts.

heart and nervous system—the transverse and longitudinal sections would be represented by 1 and 2, while P represents the parietes, or wall of the body, A the alimentary canal, M the mouth, H the heart, and N the nervous centres. 'It will be observed,' says Prof. Huxley, 'that the alimentary canal is in the middle, the principal centres of



Diagrams representing generalized sections of one of the higher Invertebrates (1, 2) and of a Vertebrate (3, 4):

1, 3, transverse; 2, 4, longitudinal section; A, alimentary canal; H, heart; P, parietes of the body; P′, parietes of neural canal; N, nervous centres of Invertebrate; N′, sympathetic, and N², cerebro spinal centres of Vertebrate; *ch*, notochord; M, mouth.

the nervous system upon one side of it, and the heart upon the other. In none of these animals, again, would you discover in the embryonic state any partition formed by the original external parietes of the body between the nervous centres and the alimentary canal.'—But the vertebrate, after it has passed through its very earliest stages of development, is, as we have seen, not a single, but a double tube; and the 'two tubes are separated by a partition, which was, primitively, a part of the external parietes of the body, but which now lies in a central position between the cerebro-spinal nervous centres and the alimentary canal. Hence a transverse section of any vertebrated animal may be represented diagramatically by fig. 3, where, for the most part, the letters have the same signification as in the foregoing case, but where P′ denotes the second or cerebro-spinal tube. The visceral tube (P) contains, as in the case of the invertebrate animal, the alimentary canal, the heart, and certain nervous centres belonging to the so-called sympathetic system. This nervous system and the heart are situated upon opposite sides of the alimentary canal, the sympathetic corresponding in position and in forming a double chain of ganglia with the chief nervous centres of the invertebrata; so that the cerebro-spinal tube appears to be a superaddition—a something not represented in the invertebrate series. In close connection with the profound difference between the chief nerve-centres of the vertebrate and the invertebrate, is another remarkable structural contrast. In all the higher invertebrates, with

a well developed nervous system, the latter is perforated by the gullet, so that the mouth is situated upon the same side of the body as the principal masses of the nervous system; and some of the ganglia of the latter lie in front of, and others behind, the œsophagus. A longitudinal section of such an animal may therefore be represented by fig. 2. A similar section of a vertebrated animal shows, on the contrary, the chief centre of the nervous system not to be perforated by the œsophagus, the latter turning away from it, and opening upon the opposite side of the body (fig. 4).—No structures having any analogy to the *chorda dorsalis*, or *notochord*, or to the *visceral arches* and *clefts* (see SKELETON), are found in the embryonic condition of any of the invertebrates.

Passing from the developmental to the structural differences, we have universally the vertebral column and the nervous centres, consisting of brain and spinal cord; and the organs of the five senses are usually present. All possess a distinct vascular system, containing blood, with red and white corpuscles in suspension, and in all (with the solitary known exception of the *amphioxus*, or Lancelet), there is a compact muscular heart of two or more cavities, and provided with valves. The breathing organ communicates with the pharynx. The alimentary canal has two apertures, usually at opposite ends of the trunk, the mouth or reception aperture never being formed of modified limbs, or working horizontally, as in the *Articulata*, but provided with two bony jaws, placed one above the other, and acting vertically.

All vertebrates possess a hepatic portal system, by which the blood of the alimentary canal is collected into a portal vein, which ramifies through the liver; also there is a peculiar system of vessels, the *lacteal system*, an appendage to the venous system, and consisting of a series of vessels which take up the products of digestion, and while they are undergoing partial elaboration, convey them to an entrance into the venous circulation, where they mingle with the venous blood soon to be sent to the lungs. The limbs of vertebrates may be totally absent, or may be in one or two pair, never more; while invertebrates have a greater number, and the muscles are attached to an exoskeleton. The muscles surround the bony levers on which they act, and thus, under the influence of the will, move the limbs and other parts. The sexes are distinct.

Comparative anatomists differ in their division of the vertebrates into classes, and as to the best basis of classification. Prof. Owen, in his *Anatomy of Vertebrates*, admits only four classes: Fishes, Reptiles, Birds, and Mammals; whereas Milne-Edwards, Huxley, and many leading authorities, separate the Amphibians from the Reptiles, and assign them a class by themselves. Prof. Owen, after describing the modifications of the piscine, reptilian, ovian, and mammalian types, observes that the vertebrates might be binarily divided into oviparous and viviparous: into anallantoic or branchiate, and allantoic or abranchiate: into *Hæmatothermal* [Gr. *haima*, blood, *thermos*, hot].

having four-chambered heart, spongy lungs, hot blood; and *Hæmatocryal* [Gr. *haima*, blood, *cruos*, cold], having less perfect breathing organs, less complex heart, with cold blood: and adopts the latter division. Huxley, on the other hand, after noticing the division of the vertebrates into *Branchiate* and *Abranchiate*, and pointing out the non-homogeneous character of the abranchiates—Mammals being so strongly separated from Birds and Reptiles—suggests the removal of them to an independent position. 'Thus,' he observes, 'the classes of the *Vertebrata* are capable of being grouped into three provinces: (1) The Ichthyoids (comprising Fishes and *Amphibia*), defined by the presence of branchiæ at some period of existence, the absence of an amnion, the absence of a rudimentary development of the allantois, nucleated blood-corpuscle, and a parasphenoid bone in the skull; (2) the Saurians, defined by the absence of branchiæ at all periods of existence, the presence of a well-developed amnion and allantois, a single occipital condyle, a complex mandibular ramus, articulated to the skull by a quadrate bone, nucleated blood-corpuscles, and no parasphenoid—comprising Reptiles and Birds: and (3) the Mammals, devoid of branchiæ, and with an amnion and an allantois, but with two occipital condyles, and a well-developed basi-occipital, and no parasphenoid, a simple mandibular ramus, articulated with the squamosal, and not with the quadratum, with mammary glands, and with non-nucleated blood-corpuscles.'—For a now accepted classification of the V., see Zoology.

VERTEX, n. *vėr'tĕks*, Vertexes, *vėr'tĕks-ĕz*, E. plu., Vertices, L. plu. *vėr'tĭ-sēz* [L. *vertex* or *vertĭcem*, a whirl, eddy, summit, the top or crown of the head—from *verto*, I turn: It. *vertice*]: the highest point; top; the summit; in *anat.*, the top or crown of the head; in *geom.*, the point opposite the base in an angle, cone, etc. Ver'tical, a. *-kăl* [F.—L.]: of or pertaining to the vertex; standing upright; placed, or being perpendicularly, over the head; straight up and down; in a position perpendicular to the plane of the horizon; situated at the vertex, top, or highest part. Ver tically, ad. *-lĭ*. Ver'ticalness, n. *-nĕs*, the state of being vertical. Vertical circles, great circles of the celestial concave which pass through the vertex of the visible hemisphere, and are therefore perpendicular to the horizon.

VERTICIL, n. *vėr'tĭ-sĭl* [L. *verticil'lus*, a little vertex, the whirl of a spindle—from *vertex*, a whirl, the top]: in *bot.*, a whorl or form of inflorescence in which the flowers are arranged opposite to each other in a circle round an axis, and at the same level; also Ver'ticel, n. *-sĕl*. Verticillate, a. *vėr-tĭs'ĭl-lāt*, and Vertic'illated, a. *-lā-tĕd*, in *bot.*, having parts arranged in a whorl, or like the rays of a wheel. Ver'ticillas'ter, n. *-lăs'tėr*, a false whorl or verticil in which the cymose inflorescence in the axils of opposite leaves presents the appearence of their flowers being disposed in whorls, as in the labiate plants.

VERT'IGO, n. *vėr'tĭ-gō*, VER'TIGOES, n. plu. *-gōz*, L. plu. VERTIG'INES, *-tĭj'ĭ-nēz* [L. *vertīgo* or *vertīginem*, a turning or whirling round—from *verto*, I turn about: It. *vertigine;* F. *vertige*, dizziness]: giddiness; dizziness; swimming of the head. VERTIG'INOUS, a. *-ĭ-nŭs*, giddy; affected with vertigo; in *OE.*, revolving. VERTIG'INOUSLY, ad. *-lĭ*. VERTIG'INOUSNESS, n. *-nĕs*, giddiness.—*Vertigo* is characterized by the sensation of being about to fall, or of turning round (subjective vertigo), or of surrounding objects appearing to move or turn round (objective vertigo). It comes on without premonitory symptoms, except a sense of disturbed balance, which may precede, accompany, or follow. Associated with it some of the following symptoms are frequently found; flashes of light before the eyes, buzzing in the ears, painful sensations in the head, nausea, vomiting, cold perspiration, muscular tremors, a full, slow, or small and frequent pulse, flushing or pallor of the face, and cold feet.

Giddiness and *dizziness* are only other names for vertigo, though giddiness commonly denotes its milder forms. Vertigo comes in paroxysms, usually repeated several times a day, and lasting from a few minutes to a quarter of an hour. This symptom is frequently chronic, the chief predisposition to it being in middle and advanced age: childhood is nearly exempt. A plethoric constitution, especially if associated with a sedentary mode of life, the so-called change of life in women, the debility brought on by exhausting discharges, and the excessive use of spirituous liquors, may be regarded as predisposing causes. It is frequently caused by eyestrain, and the habitual recurrence of attacks of vertigo without evident cause should lead one to have the eyes examined by a competent oculist. The direct cause of vertigo is doubtless irregularity in the supply of blood to the brain: hence any condition that occasions either increase or diminution in the supply of blood is followed by vertigo. Injuries and diseases of the brain, especially of the cerebellum, are often accompanied by this symptom, as also are diseases of the spleen. Among the most common exciting causes are intoxication from alcoholic drinks or from narcotics (tobacco, etc.); inhaling carbonic acid gas; semi-poisoning by belladonna, digitalis, hyoscyamus, etc.; gorging the stomach with indigestible food (especially if highly carbonated drinks are at the same time taken); unusual movements or positions of the body, and especially of the head, as in sea-voyages; continued stooping, etc.

A peculiar kind of vertigo occurs in dreams. The direction of the apparent movement is generally from above downward; dreams of tumbling down stairs being, according to Romberg, the most common; people also dream of sinking into the earth, of chasms opening before them, etc.

The following rules are generally applicable for treatment of patients subject to giddiness. They should avoid

violent, continuous, or rotatory exercise, abstain from highly nutritious or heating articles of diet, and from late suppers; they should not indulge in too much sleep, or the use of feather-beds, or of warm baths. Counter-irritation to the skin by sinapisms, foot-baths with mustard, use of the flesh-brush, with cold washing of the body, and administration of cooling laxatives, are to be recommended. When the patient feels the attack coming on, Romberg directs that he should 'direct his full attention to movement.'

Remarkable vertiginous conditions can be artificially induced. Vertical vertigo can be produced thus: The experimenter—who must be standing—has a somewhat heavy weight attached to each hand, and as he carefully watches for some time the sensation produced by gravitation he feels the weights growing heavier and heavier, till he can no longer bear them. Then putting them down, he feels as if impelled to mount straight upward and as if the arms were shortened, and the hands must creep up to the thorax. Similar experiments with the muscles of the eye afford still more striking results. 'If the face,' says Purkinje (anatomist, whose experiments were published 1820-27), 'be turned to the ceiling, and the eye be fixed on a given point, round which, as the pole of a vertical axis, the body is turned a certain number of times, the visible objects of the ceiling, as well as the floor of the room, will, if the position of the head and the direction of the eyes be maintained, appear to move in a horizontal direction. If, during this procedure, the head be brought back into the ordinary upright position, the horizontal will be turned into vertical vertigo; and this sensation will be communicated to the tactile sense of the hands and feet, the floor appearing to sink down on one side, and to rise on the other.

An analogous effect is produced by standing on the brink of, or in, a running stream, and fixing the eyes on the water: after a time, the sensation begins all at once of being borne along against the current. When this sensation comes on in wading in a river, it is very difficult to keep one's footing; hence it is dangerous to let the eyes rest on the current close by.

VERTU, n. *vėr'tô* [It. *vertù*, virtue, worth]: used in the phrase ARTICLES OF VERTU, objects of artistic value, antiquarian curiosities, etc.; spelled also VIRTU (q.v.).

VERTUE, *vėr'tū*, GEORGE: English engraver and antiquary: 1684—1756, July 24; b. London. At the age of 13 he was apprenticed to a French heraldic engraver in London; subsequently he worked seven years as pupil of Michael Vandergucht; and 1709 began business for himself. He was generously befriended by Sir Godfrey Kneller, the great portrait-painter. Vertue's talent soon made itself recognized; and his eminent success in an engraved portrait of Abp. Tillotson, placed him in the front rank of his profession. He reproduced portraits

by Kneller, Richardson, and one or two others of the more eminent painters of the day; and he issued a large engraved head of George I., which had an immense sale. Meanwhile, having long applied himself to antiquarian research, he was appointed, 1717, engraver of the Soc. of Antiquaries. He lies buried in the cloisters of Westminster Abbey.—Vertue was a man of various accomplishments, artistic and linguistic. He projected a *History of the Arts in England;* and had accumulated masses of material for it, which, at his death, were bought by Walpole, who made free use of them in his *Anecdotes of Painting in England.* In a supplementary vol. of that work, entitled *A Catalogue of Engravers, etc.,* is a full list of Vertue's works; with notices of his character, whose genuine worth is indicated in an expression of respect from the frequently caustic and supercilious Walpole.

VERTUM'NUS. See POMONA.

VER'ULAM. See BACON, FRANCIS (Lord Verulam).

VERULAMIAN, a. *vĕr-ū-lā'mĭ-ăn* [L. *Verulamium,* the ancient name of St. Albans]: of or pertaining to St. Albans, or to Francis Bacon, Lord Verulam.

VERVAIN, n. *vĕr'vān* [F. *verveine*—from L. *verbēna,* the bough of a laurel, olive, or myrtle]: plant of genus *Verbēna* and order *Verbenaceæ* (q.v.); a sacred plant among the Greeks, and held in superstitious reverence by the Druids.—*Vervain* has a 5-cleft calyx, one division a little shorter than the rest, limb of the corolla irregularly 5-lobed, stamens (4 or 2) included within the corolla, fruit a 4-seeded utricle, which soon breaks, so that the ripe fruit consists of four adherent achenia. The species are herbaceous plants and small shrubs, with undivided, trifid, or multifid leaves, natives chiefly of warmer temperate parts of the world. The Common Vervain (*V. officinalis*), perennial plant, with erect somewhat hispid stem, rough lanceolate inciso-serrate or trifid and laciniate leaves, and filiform spikes of pale lilac flowers, is a native of Europe, and somewhat naturalized in the United States, southward. It is a common ornament of flower-borders, continuing to blossom all summer. It had formerly very high reputation as a medicinal plant, but its virtues are now regarded as imaginary. A number of species of Vervain, chiefly Amer. and E. Indian, are occasionally cultivated for the beauty of their flowers. The Blue-Vervain (*V. hastata*), 4—6 ft. high, is common in the United States; the White Vervain has small flowers; the Hoary Vervain, with large blue flowers, has downy leaves; the Bracted Vervain, of the w. and s.w., has small purple flowers; and *V. Aubletia,* an annual with large light purple flowers, of the w. and s., is cultivated. Our species have numerous spontaneous hybrids.

VERVE, n. *vĕrv* [F. *verve,* rapture, animation—from mid. L. *verva,* a ram's head sculptured, then a fanciful

sculpture, caprice of fancy of an artist]: spirit; imagination; energy; mental excitement or enthusiasm; rapture; animation.

VERVĖLS, *vĕr'vĕlz,* or VAR'VELS, *vâr'-:* small rings attached to the ends of the jesses of a hawk, through which the leash is passed that fastens the hawk to its block: they occur as a heraldic charge.

VERVIERS, *vĕr-vē-ā':* manufacturing town of Belgium, prov. of Liége; picturesquely situated on the river Vesdre, 15 m. e.s.e. of Liége, on the Brussels and Cologne railway. It is of recent growth, and consists almost wholly of workshops and of the dwellings of the manufacturers and their workmen. Verviers is the great centre of cloth-manufacture in Belgium; the total produce being valued at about $16,000,000 annually. In and around the town are 60 cloth-mills, employing 40,000 persons and 155 steam-engines. The exports of cloth are chiefly coarse woolens, which are said to be better and cheaper than those of either France or Great Britain. The waters of the Vesdre are thought to have qualities especially fitted for dyeing.—Pop. (1901) 49,353.

VERY, a. *vĕr'ĭ* [OE. *verray*—from OF. *vcrai;* F. *vrai,* true—from L. *vērax* or *vērus,* true]: true; real; actual; perfect; the same, emphatically: AD. in a great or eminent degree. VER'ILY, ad. *-lĭ,* in truth; really; certainly.

VERY, JONES: American poet: b. Salem, Mass., 1813, Aug. 28; d. there 1880, May 8. He was graduated at Harvard in 1836, and was Greek tutor there 1836-8. He became a Unitarian minister in 1843, but never held a pastoral charge, although he preached occasionally. In 1839 he published a small volume of *Essays and Poems;* the latter, among which '*The Painted Columbine*' is perhaps the best known, indicating an appreciative love of nature, and a deep religious feeling with a tendency toward mysticism, and these qualities are especially marked in his sonnets, which follow the Shakespearian model. His life was mainly spent in retirement at Salem. Consult *Poems and Essays* (1880), with memoir by J. F. Clarke.

VESALIUS, *vē-sā'lĭ-ŭs,* ANDREAS: termed the 'founder of human anatomy': 1514-64; b. Brussels. He studied classics at Louvain, and anatomy and medicine at Cologne, at Montpellier, and finally at Paris. Driven from Paris by the outbreak of war between Francis I. and Charles V., he returned to the Low Countries, where he served as physician and surgeon in the imperial army 1535-37. In 1539 he went by invitation to Pavia, where he taught anatomy till 1543. From Pavia he went, again as lecturer in anatomy, to Bologna and Pisa; and 1544 was made physician-in-chief to Charles V. at Madrid, where mainly he continued to reside. His prosperity had a sudden end. A Spanish gentleman died 1564 whose

relatives granted Vesalius permission to dissect the body. Life, however, was ascertained to be not quite extinct when Vesalius began the operation, the heart being found still palpitating. The family of the deceased, with inconsiderate vindictiveness, arraigned Vesalius before the Inquisition, and some terrible sentence would have been passed on him but for the interposition of Philip II., who procured for the unfortunate anatomist the milder penalty of an injunction to go on pilgrimage to the Holy Land. Vesalius, accordingly, in the train of the Venetian Gen. Malateste, proceeded to Cyprus, and thence to Jerusalem. While sojourning in that city, he was invited to occupy the chair of anatomy just vacated in Padua by Fallopius. It is supposed that, in compliance with this invitation, he embarked for Europe; but the ship in which he sailed was wrecked on the shore of Zante; and, overcome by hunger, he died in a village of that island.

Vesalius greatly contributed to disenthral the minds of his contemporaries from their servile belief in the ancients. Galen was then to anatomy what Aristotle was to logical method; and the youthful Vesalius assailed Galen's authority, not with rash self-confidence, nor mere reformatory zeal, but on the solid basis of independent researches into nature. His first great publication was a series of anatomical tables, *Suorum Librorum de Corporis Humani Anatome Epitome* (Basel 1542 fol.). The plates, from drawings by the best masters, and engraved on wood, were nearly all reincorporated in his great work *De Corporis Humani Fabrica Libri Septem* (Basel 1543). Great value is placed on the earliest impressions of these plates, whose explanations, however, were revised by Vesalius in his 2d ed. (Basel 1555). He pub. 1546 his severe attack on the errors of Galen's anatomy, the well-known *De Radicis Chinæ usu Epistola.* The cause of Galen was then espoused by Galen's disciple Fallopius, to whom Vesalius replied in his trenchant *Anatomicarum Gabrielis Fallopii Observationum Examen* (1561). After his death, a work entitled *Chirurgia Magna,* pub. under his name, but really a compilation from the ancient anatomists, was edited by his disciple Borgarucci. The great edition of Vesalius's works appeared with fine plates at Leyden 1725, 2 vols. fol., under superintendence of Boerhaave and Albinus.

VESANIA, n. *vē-sā′nĭ-a* [L. madness]: in *mental pathol.,* derangement of the intellectual and moral faculties without coma or fever. Some nosologists include under this term different kinds of mental alienation.

VESICANT, n. *vĕs′ĭ-kănt* [L. *vēsīca,* the bladder in the bodies of animals, a blister: It. *vescica;* F. *vessie,* bladder]: in *med.,* a substance that raises blisters on the skin: ADJ. producing a blister. VESICA, n. *vē-sī′kă,* in *anat.,* the bladder. VES′ICAL, a. *-ĭ-kăl,* pert. to a vesicle; pert. to or in relationship with the bladder. VES′ICATE,

v. *-kāt*, to blister; to raise blisters on. VES'ICATING, imp. VES'ICATED, pp. VES'ICA'TION, n. *-kā'shŭn*, the process of raising blisters on the skin. VESICATORY, n. *vĕs-ĭk'ă-tėr-ĭ*, a blistering application: ADJ. blistering; having the property of raising a blister on the skin. VES'ICLE, n. *-ĭ-kl*, or VES'ICULE, n. *-kūl* [F. *vésicule*—from L. *vēsīcŭla*, a little bladder]: a small bladder-like tumor in an animal body; any small membranous cavity in animals or plants. VESIC'ULA, n. *vĕs-ĭk'ū-lă*, in *bot.*, a little blister composed of cells. VESICULAR, a. *vĕs-ĭk'ū-lėr*, or VESIC'ULATE, a. *-ū-lāt*, or VESIC'ULOUS, a. *-lŭs*, pert. to or consisting of vesicles; having little bladders or cell-like cavities. VESICAL DISEASES: see BLADDER: URINE: CALCULUS: LITHOTOMY: LITHONTRIPTICS: ETC.—*Vesicants* or blistering agents are substances which, if kept in contact for some time with the surface of the body, excite such irritation as to cause effusion of serum from the true skin, leading to separation and elevation of the cuticle, and formation of a vesicle or blister. Vesicants are employed: (1) For relieving or removing the diseased condition of some internal part, by producing a determination of blood from the interior to the surface over the seat of the affection: (2) As general stimulants to the system, often beneficial in advanced stages of low continued fever: (3) For the direct purpose of withdrawing serum from the vascular system, for which they are prescribed with advantage in cases of sudden effusion into the pericardium or the pleura; blisters for this purpose should be of large size, and should be kept in contact with the skin sufficiently long to produce their full effect (24 hours being in some persons necessary): (4) For removing the cuticle, to permit the direct application of various medical agents (especially mercury and morphine) to the absorbing surface of the true skin. In infancy and childhood, these agents must be used with extreme caution.

To produce vesication, *Cantharidine* (q.v.)—active principle of *Cantharides*, or Spanish Flies—in one of its various forms, is generally employed, though other substances also are used. Cantharidine is a white crystalline substance, extracted from the powdered insects by rectified spirit, and whose composition is represented by the formula $C_5H_6O_2$. It is a very active poison, and produces immediate inflammation of the skin wherever it comes in contact with it, is very volatile even at ordinary temperatures, and is soluble not only in alcohol, but also in chloroform, ether, strong acetic acid, and many oils. In preparing a blister, it is expedient to sketch the desired shape and size; and before applying it the skin should be well washed with warm water. If the patient's skin is not easily acted upon, the part should be sponged with vinegar; but if it is very susceptible a piece of tissue-paper should be placed between the skin and the plaster. To insure close contact with the skin, the blister

should be gently warmed, carefully applied, avoiding creases, and kept in its place by a bandage; and to produce its full action, it should be kept on for 10-12 hours. If, on removal after that time, full vesication has not been produced, a hot poultice will often produce the desired effect. The raised cuticle should be punctured, to allow of the escape of the serum (except in the case of children and persons of very irritable skin, when the vesications should be left unopened), and a dressing of simple ointment or spermaceti ointment on soft rag applied, and repeated in 24 hours; or the part may be at once covered with cotton-wool. The troublesome *itching* which often follows application of a blister, is best relieved by a bread-and-water poultice, moistened with the dilute solution of acetate of lead. *Collodium Vesicans* is prepared by mixing equal parts of collodium and cantharidal ether. It possesses the advantage that its strength can be readily increased or diminished.

When a blistering agent with very rapid action is required, as in the state of collapse in cholera, recourse may be had to the application of boiling or nearly boiling water to a portion of the abdomen, the surrounding surface being protected by a wall of damp cloths. *Cold water* may be used as efficiently as boiling water: a piece of bibulous paper (common blotting-paper, e.g.) should be soaked in cold water, applied to the part to be vesicated, and covered with three or four folds of dry paper. A common smoothing-iron heated to 212° is then pressed three or four times over all; and on removing the paper, the part will be found vesicated. In less urgent cases an almost immediate blister may be produced by saturating a piece of lint in the strong solution of ammonia, and applying it to the skin with moderate pressure. By the time the ammonia has evaporated, the required result is usually obtained. When it is desired to keep up a discharge from a blistered surface (instead of healing it, as is commonly required), or to produce a *perpetual blister*, the raw surface is dressed with irritants of various kinds, such as savine ointment. At each fresh dressing (in summer twice a day), the part should be cleansed with warm water.

VESICA PISCIS, *vē-sī'kâ pĭs'ĭs* (literally, a fish's sound or swimming-bladder): the ovoid aureole or glory (formed by the intersection of two circles having a common radius), which, in the religious symbolism of the early middle ages, is often represented encircling the whole body of the Lord Jesus. This form is supposed to have been gradually evolved out of the figure of the fish, prominent in the symbolism of the early Christians on sarcophagi and elsewhere, and whose use arose out of an anagram on the initial letters of Ιησους Χρισῖὸς Θεου Υἱὸς Σωῖήρ, Jesus Christ, Son of God, Saviour: these initials formed the Greek word ἰχθύς (fish).

VESPASIAN, *vĕs-pā'zhĭ-an*, TITUS FLAVIUS VESPASIANUS): Roman emperor, 10th of the 12 Cæsars: A.D. 9—79 (reigned 70–79); b. at Reate, in the Sabine country; of humble origin. After serving with distinction in Thrace, Britain, and Africa, he was sent (A.D. 67) by Nero, to conduct the Jewish war. This appointment he owed to his recognized merits, for he was not a favorite with the emperor, whom he had offended by falling asleep during the recitation of one of his poetical compositions. He conducted the war with vigor, reduced Judea, and finally laid siege to Jerusalem. At this time occurred the struggle for the imperial dignity between Otho and Vitellius, after the murder of Galba. The legions serving in the East were indignant that the empire should be disposed of at the will of the Pretorian guards. Their own general was proclaimed emperor, and quickly acknowledged as such by all the East, and, after the death of Vitellius, by Italy and all the provinces. Leaving his son Titus to prosecute the siege of Jerusalem, V. repaired to Rome, where he was joyfully received, and immediately set about the work of restoring order. He kept his soldiers under firm discipline, reformed abuses in the civil administration, co-operated cordially with the senate in improving the finances, and did much by the example of his plain and simple life to lessen the ill effects of the prodigality and luxury of his predecessors. From an interesting biography of V. by Suetonius, we are enabled to estimate clearly the character of the man. He was unostentatious in his mode of life, too shrewd to listen to flattery, liked a joke, was good-humored and easy of access. He was charged with being avaricious; but though at times he seems to have sought money by ways unusual with Roman emperors, and was economical in personal expenditure, he was lavish in embellishing the city with public works, a munificent patron of the arts and sciences, and liberal in aiding impoverished senators, and cities desolated by natural calamities. In A.D. 70 (soon after the beginning of his reign) his son Titus captured Jerusalem, and the 'peace of Vespasian' ensued. V. is chargeable with one or two acts of cruelty against insolent enemies; but usually he bore provocation with great good-temper. His son Titus succeeded him, and another son, Domitian, succeeded Titus.

VESPER, n. *vĕs'pĕr* [OF. *vespre*—from L. *vesper;* Gr. *(h)esperos*, the evening, the evening star: It *vespero:* F. *vêpre*]: the evening: the name given to the planet Venus when she appears after sunset. VES'PERS, n. plu. *-pĕrz*, 6th of the canonical hours of the Rom. Cath. Breviary, whose service begins at about 6 P.M. It is a service of very ancient use, being plainly referred to in the apostolical constitutions, and is noticeable as that one among the canonical hours which in the Rom. Cath. Church continues to be regularly sung as one of the ordinary public services of parish churches, no less than in cathedrals, where all the 'hours' are chanted. It resembles lauds, and consists of five psalms and antiphons, a lesson, a hymn with versicle and response, a canticle (the Magnificat), and a collect or

prayer. The psalms sung at vespers are Ps. cix.—cxlvii., which are distributed over the several days of the week. The service of vespers has given occasion to some of the most brilliant efforts of modern musical composers. The Evening Prayer of the Anglican Prayer-book corresponds partly with the vespers, partly with the compline (*completorium*) of the Roman Breviary. VES'PER, a. relating to the evening or service of vespers. VES'PERTINE, a. *-pėr-tin*, pert. to the evening. SICILIAN VESPERS: see SICILIAN.

VESPERTILIONIDÆ, *vĕs-pėr-tĭl-ĭ-ŏn'ĭ-dē:* family of bats, of which the type genus is *Vespertilio*. The V. belong to the naked-nosed division (*Gymnorhina*) of insectivorous small-winged bats. Like all the *Gymnorhina* division, the V. have no nasal appendage such as is seen in the *Histiophora* or leaf-nosed division; and they differ from the blood-sucking bats in the character of the digestive organs and in the dentition. They are distinguished from the rest of the *Gymnorhina* by certain special characters of teeth and skull, and by having the tail inclosed in a voluminous interfemoral membrane. There are many genera, represented by 150 species of small bats found all over the world. Some naturalists divide V. into 2 subfamilies, *Vespertilioninæ* and *Nycticejinæ*.

VESPERTINE, n.: in *geol.*, the term applied to the 13th series of the Appalachian strata, corresponding to the lowest Carboniferous group of Europe. In Penn. the greatest thickness exceeds 2,000 ft.

VESPIARY, n. *vĕs'pĭ-ėr-ĭ* [L. *vespa*, a wasp]: the nest or habitation of insects of the wasp kind.

VESPIDÆ, n. plu. *vĕs'pĭ-dē* [from L. *vespa*, wasp]: family of hymenopterous insects of which Vespa is the type: see WASP.

VESPUC'CI, AMERIGO: see AMERIGO VESPUCCI.

VESSEL, n. *vĕs'sĕl* [OF. *vaissel, veissel, vessel*, a ship—from mid. L. *vascellum;* L. *vascŭlum*, a small vessel—from *vas*, a vessel: It. *vascello*]: a utensil for holding something, as a cup, a kettle, a barrel, etc.; a hollow structure made to float on water; a ship in general; any tube or canal for containing a liquid, as the blood in animals and the sap in vegetables, hence blood-*vessels*, sap-*vessels;* in *Scrip.*, a name applied to persons regarded as receivers or holders of something, as, '*vessels* of wrath.' LATICIFEROUS VESSELS, vessels in plants consisting of branched tubes filled with a milk-like liquid. PITTED VESSELS, dotted ducts, common in plants, which contain numerous incomplete pores. SPIRAL VESSELS, vessels consisting of very long tubes clustered together, and each having a spiral fibre or fibres in its interior.

VESSIGNON, n. *vĕs'sĭg-nŏn* [F. *vessigon*—from L. *vēsīca*, a bladder, a blister]: a soft swelling on a horse's leg; wind-gall.

VEST, n. *vĕst* [F. *veste*—from L. *vestis*, a covering for the body: akin to Gr. *esthēs*, clothing: Skr. *vas*, to be clothed]: an outer garment; a vestment: hence, garb or array; specially, a body-garment without sleeves, worn by men under the coat, or a somewhat similar garment worn by women; a waistcoat: V. to clothe; to cover or encompass closely; to furnish with; to invest, as with authority or right; in *law*, to put in possession of; to take effect, or descend to, as a title or right, with *in*. VEST'ING, imp.: N. material for waistcoats. VEST'ED, pp.: ADJ. clothed or arrayed; fixed; not in a state of contingency, as *vested* interests. VEST'IARY, n. *-ĭ-ĕr-ĭ*, a robing-room or place for keeping clothes. VEST'MENT, n. *-mĕnt*, something put on; an outer robe. VESTURE, n. *vĕst'ūr* or *-chûr*, a garment; dress; clothing; covering. VES'TURAL, a. *-tū-răl*, or VEST'IARY, a. *-ĭ-ĕr-ĭ*, of or pertaining to dress. TO VEST IN, to put in possession of; to clothe with. TO VEST WITH, to clothe; to invest with, as legal power. ECCLESIASTICAL VESTMENTS, the garments (other than the cassock and their ordinary clothes) worn by clergymen, etc., in performance of their sacred functions—including the alb, amice, chasuble, cope, maniple, rochet, stole, surplice, etc. (see VESTMENTS, SACRED).—SYN. of 'vest, n.': vesture; vestment; garment; robe; dress; waistcoat; attire; costume; habit.

VESTA, n. *vĕs'tă* [L. *Vesta*, the goddess Vesta: Gr. *(h)estĭa*, a fireplace or hearth, the goddess Vesta]; among the *anc. Romans*, the goddess of the domestic hearth and of fire, corresponding to the Greek *Hestia* (q.v.), worshipped as the patroness of chastity and of domestic union and happiness: one of the asteroids, discovered at Bremen by Olbers, 1807: a match or wax-light ignited by friction. VES'TAL, n. *-tăl*, one of the six virgin priestesses of Vesta (see below); a virgin; a woman pure and chaste: ADJ. pert. to Vesta; chaste; undefiled.—The worship of *Vesta* was the embodiment of an idea deeply rooted in the Latin, particularly in the Roman mind—viz., that the state was one great family. As the Lares were the tutelary guardians of the individual household, so the Penates and Vesta watched over the welfare of the state. The Greek *Hestia* (hearth) is a kindred conception. Each community had its public altar to Vesta—the central one for the whole Latin people being at Lanuvium, about 20 m. from Rome, on the Appian Way, where the Roman consuls and other officers offered sacrifices on entering upon their offices. The common hearth of the Greeks was at Delphi. There was also a temple of Vesta at Rome, in the Forum near the temple of the Penates (see LAR, etc.), between the Palatine and Capitoline hills; it was open during the day, and closed during the night. On March 1 in each year, the sacred fire was renewed; on June 9 the *Vestalia* were held in honor of the goddess; and June 15 the temple was cleared out, and the dirt carried into a narrow lane (*angiportus*) behind the temple, entrance to which was barred by a locked gate, through which none might enter.

The goddess herself was a virgin, and her fire was carefully tended night and day by the *Vestal* virgins, originally

four in number, but two were subsequently added. At first they were chosen by the kings; but after the expulsion of the kings, by the Pontifex Maximus, who, when a vacancy had to be filled, selected 20 damsels from six to ten years of age, and from these one was chosen by lot. The necessary qualifications for the office of Vestal were, that the maiden should be the daughter of free-born parents, then living and resident in Italy, and engaged in no dishonorable occupation; that she herself should not be younger than six, nor older than ten years, and free from physical defect. The priestess was bound to the service of Vesta for 30 years, the first 10 being occupied with learning her duties, the next 10 in performing them, and the last 10 in teaching them to others. On entering office, the Vestal took on herself a solemn vow of chastity for thirty years; violation of this vow carried with it the punishment of being buried alive in a subterranean vault near the Colline Gate, to which she was carried on a bier, as if dead, and where she found a light, with scanty supply of bread, water, milk, and oil, after whose exhaustion she perished. Violation of the vow was very rare. The chief duty of the Vestals was to keep the fire on the altar of the goddess ever burning; they had also to present offerings to Vesta, sprinkle the temple every morning with water drawn from the Egerian well, and guard the sacred relics, which were a pledge granted by fate for the permanency of the Roman sway. As the extinction of the sacred fire was deemed emblematic of the extinction of the state, the Vestal who, by neglect of duty, allowed this to happen, was severely punished, the penalty being that she should be stripped and scourged by the pontifex in the dark: the fire was again rekindled by the friction of two pieces of wood from a 'lucky tree.'

As a compensation for the strictness of the lives which they had to lead, the Vestals had many remarkable privileges—e.g., they were entirely freed from paternal authority, and indeed from the sway of most of the Roman laws; they could make a will, and give evidence without taking an oath; they had a seat assigned them in the best part of the theatre; they lived in great splendor, and were held in semi-royal honor, and received homage from the highest officers of the state; and even the plebs, in their most reckless moments, respected them. They seem to have had very great influence in many official appointments. If the eye of a Vestal should chance to light on a criminal on his way to execution, she had power to pardon him, if the meeting were accidental. At the expiration of the period of service, a Vestal, if she chose, could marry, though to do so was considered very unlucky.

VESTERAA'LEN Islands: see Lofoden.

VESTIBULE, n. *vĕs'tĭ-būl* [F. *vestibule*—from L. *vestibŭlum*, a fore-court: It. *vestibulo*]: the porch or entrance into a house; a large open space before the door, but covered; an antechamber; a passage; a hall. Vestibulum, n. *vĕs-tĭb'ū-lŭm*, a vestibule. Vestibular, a. *vĕs-tĭb'ū-lĕr*, pertaining to or resembling a vestibule.

VESTIGE, n. *věs'tij* [F. *vestige*, a footstep, a trace—from L. *vestigĭum*, a footprint: It. *vestigio*]: a track; a mark left in passing; a footprint; the remains or traces of something that has passed away: plu. VES'TIGES, *-ĕz.*—SYN. of 'vestige': trace; sign; token; footstep.

VEST'MENTS, SACRED: distinctive outer garments worn by ministers of religion in the discharge of their office. The use of a distinctive costume in public worship formed a part of the Jewish, and of almost all the ancient religions, and has had place in greater or less degree in the religions of the modern world (see Lipsius, *De Monument. et Exemp. Polit*, l. i. c. 3). Ex. xxviii is wholly given to a description of the V. of the Jewish high-priest; and the directions for those of the inferior functionaries are almost equally minute. Whether the same characteristic was carried into the early Christian worship, has been a subject of controversy; many writers seeing ground for the opinion that the costume in use among Christian ministers from a very early period was not originally distinctive of an order or orders of clergy, but was simply the ordinary costume of Rome and of the East in the first centuries, becoming distinctive of sacred ministers, because by them it was retained unaltered, whereas in the every-day world the costume varied in fashion, in material, in color every few years. However the use may have originated, there is little doubt that from an early time Christian ministers used some distinctive dress in public worship; and Rom. Cath. writers find traces in the beginning of the 5th c. of the practice of blessing the V. destined for the public services of the church: see Binterim, *Denkwürdigkeiten*, IV. i. 198. From the 8th c. the rituals of the West all contain formularies for the blessing of the V. worn by bishops, priests, deacons, etc.—The V. used in celebration of the mass by Rom. Cath. priests are six in number—(1) the amice, a square piece of linen, worn on the shoulders, and in some religious orders, over the head, which latter appears to have been the ancient mode; (2) the alb, a long, loose-sleeved, linen gown, sometimes richly embroidered or 'apparelled' at the lower border; (3) the cincture, a linen cord tied around the waist, and confining the folds of the alb; (4) the maniple, a narrow strip of embroidered silk, pendent from the arm; (5) the stole, a long narrow scarf, similarly embroidered, and worn by priests around the neck, the ends being crossed over the breast or pendent in front, and worn by deacons transversely over one shoulder; (6) the chasuble, a loose flowing vestment, open at the sides, having a hole in the centre, through which the head passes, and falling down over the breast and back to some distance below the knees (for these V., see the respective titles—especially CHASUBLE: STOLE: SURPLICE). The three last named are always of the same material and color; but this color, which appears primitively to have been in all cases white, now, and for many centuries, varies according to seasons and festivals, five different colors being employed in the cycle of ecclesiastical services—white, red, green, violet, and black. Cloth of

gold, however, may be substituted for any of these, except the last. A cap, called *biretum*, is worn in approaching the altar, but is laid aside during mass. Besides these V. for priests during the mass, bishops in the same service use also two inner V., of nearly the same form as the chasuble, called 'dalmatic' and 'tunic,' also embroidered gloves and shoes, or buskins, together with the distinctive episcopal ornaments—the pectoral cross, the Mitre (q.v.), the pastoral staff, or, if archbishops, the Crosier (q.v.), and ring. Archbishops celebrating mass wear also the Pallium (q.v.). Deacons, at the same service, wear a robe, called dalmatic; and sub-deacons, a tunic. The sub-deacon is not privileged to wear the stole. In other public services, priests and bishops wear a large flowing cloak, called cope (Lat. *pluviale*), with a pendent cape or hood, called orfrey. In the ministration of the other sacraments, also in administering communion, priests wear the surplice (which is but a short alb) with the stole.—The V. of the Greek priests differ considerably in general character and effect from those of the Latin clergy, though the several portions of the costume are substantially the same as those of the Latin costume already described. The *stoicharion*, the *zoné*, the *orarion*, the *epimanikia*, and the *phelorion*, correspond respectively with the alb, cincture, stole, maniple, and chasuble. Greek bishops wear the *omophorion*, which corresponds with the later pallium. The *phelorion*, however, is so ample in its folds as to resemble the Latin cope rather than the chasuble; and the general effect of the Greek V., as of the Eastern rites in general, is more picturesque.

The natural effect of the Reformation in the 16th c. was to put aside the costume at the same time and on the same grounds with the ceremonies of the existing worship. This was done, however, by the different churches of the Reformers in very various degrees. The Calvinistic worship may be said to have nearly dispensed with V.—The Lutherans generally retained with the cassock the alb, and in some countries the chasuble.—In the Anglican Church, practice has been various: for disputes about the use of the Surplice, see that title. As to the rest of the costume, the first Prayer-book retained the Roman vestments with little change; and as, by a remarkable accident, the rubric of this Prayer-book has never been formally repealed, a ritualistic movement in the English Church has reintroduced in some places almost every detail of the Roman costume in the communion and other services—an innovation which has in many instances been vigorously resisted, but which has had gradually increasing success: see RITUALISM.

VESTRY, n. *vĕst'rĭ* [F. *vestiaire*, a robing-room—from L. *vestiārĭum*, a wardrobe—from *vestis*, a garment (see VEST)]: apartment attached to a church in which the ecclesiastical vestments are kept; apartment for parochial meetings: in the Church of England, an assembly of the inhabitants of a parish for deliberating on parish affairs (see PARISH): a committee elected annually in a parish to manage its temporal affairs in conjunction with the churchwardens. SELECT VESTRY, a smaller body deputed to rep-

resent the larger vestry. VEST'RYMAN, n. the member of a vestry.—In the Prot. Episc. Chh. in the United States, the temporal affairs of each church or parish are administered by a board called the V. or the V. board, whose members are usually chosen annually; but the mode of electing them, the sphere of their functions, and the time of election differ in different dioceses. It is usual, however, to hold the election for vestrymen at Easter: the wardens, who are associated with the V. in administering the temporalities of the church, are chosen at the same time, and for the same term. The V. has no voice in the conduct of the spiritual affairs of the parish, and no control of the rector as regards the church services, his doctrine, etc. When a church is vacant, the V. represents the parish in its relations to the bp., the diocese, the diocesan convention, etc. It elects a clergyman for rector of the parish, and nominates him to the bishop—the bishop's approval being requisite to the election taking effect.

VESTURE: see under VEST.

VESUVIAN, a. *vē-sū'vĭ-ăn:* pert. to *Vesuvius* (q.v.), volcano near Naples: N. reddish-brown mineral of the garnet family—found in volcanic rocks and frequently ejected in masses from Vesuvius (q.v.), whence the name; called also *idocrase, pyramidal garnet,* and *vesuvianite;* hardness nearly equal to that of quartz; colors various—yellow, green, brown, almost black, rarely azure. V. is composed of silica, alumina, and lime, in somewhat varying, but not very unequal proportions, with a little oxide of iron and oxide of manganese. It is employed as an ornamental stone, but is not very highly valued. The green-colored varieties are known as *Volcanic Chrysolite,* and the brown as *Volcanic Hyacinth.*—The name V. is applied also to a kind of fusee used by smokers in lighting cigars, etc.

VESUVIUS, *vĕ-sū'vĭ-ŭs:* celebrated volcano; near the e. shore of the Bay of Naples; about 10 m. from the city of Naples. It is a solitary mountain, rising majestically from the plain of Campania, having at the base a circumference of about 30 m., and dividing into two summits, Somma and V. Proper. The height of the mountain and form of its apex are subject to frequent changes by eruptions. It is estimated to be at present nearly 4,000 ft. high. In the single eruption of 1822, it lost 800 ft., nearly all of which has been restored by subsequent eruptions Before that event, the summit was a rough and rocky plain, covered with blocks of lava and scoriæ, and rent by numerous fissures, from which clouds of smoke came forth. But it was then altered to a vast elliptical chasm, three m. in circumference, three-quarters of a m. at the greatest diameter, and about 2,000 ft. deep.

The first recorded eruption took place A.D. 79. Warnings had been given 16 years before by a great earthquake, which shattered the cities of Herculaneum and Pompeii, and the earth was frequently shaken by slight shocks until 79, Aug., when they became more numerous and violent.

Previous to this, V. was not suspected to be a volcano. Its sides were covered with famous vines, and its ancient crater, partly filled with water, formed the stronghold of the rebel chief, Spartacus. The morning of Aug. 24 brought comparative repose; but in the course of the day, a huge black cloud rose from the mountain, from which stones, ashes, and pumice were poured down on all the region around. The elder Pliny, who commanded the Roman fleet at Misenum, sailed to the help of the distracted inhabitants: he landed near the base of the mountain, was enveloped in sulphurous vapor, and was suffocated. The younger Pliny gives a graphic account of the eruption in two well-known letters to Tacitus. No lava was ejected on this occasion, nor indeed in any eruption in historic times till 1066. In the eruption of 79, Pompeii (q.v.) was buried under 20 ft. of loose ashes, and remained unknown for more than 16 centuries. A torrent of mud spread over Herculaneum (q.v.), which, by additions from subsequent repeated eruptions, now forms a thickness of 80 or 100 ft. Since this first famous eruption, V. has been an active volcano, and has been frequently but irregularly in eruption, about 60 great and numerous smaller ones having taken place. In 472, the eruption was so great that the ashes fell even at Constantinople, and caused great alarm there. The summit known as Monte Nuovo was, 1538, forced up in two days to the height of 413 ft., with circumference of 8,000 ft. In 1631, the villages at the foot of the mountain were covered with lava, and torrents of boiling water were sent forth: 18,000 persons are said to have lost their lives at this time. Since the eruption described by Pliny, one of the most famous is that of 1779, of which Sir William Hamilton, then Brit. minister at Naples, gives an interesting account. In the spring of that year, V. began to pour forth lava; this was succeeded by rumbling noises and puffs of smoke; then jets of red-hot stones and ashes appeared, and increased in number and intensity, until the eruption arrived at its climax Aug. 5–10. Then enormous volumes of white clouds rose from the crater to a height four times that of the mountain, and lava poured from the crater in torrents down the sides of the cone. This was followed by columns of fire, which rose on some occasions to three times the height of V. or more than two m. In the midst of all this, showers of stones, scoriæ, and ashes were thrown to a great height. One mass of rock ejected was 108 ft. in circumference, and 17 ft. high. A more terrible eruption took place 15 years later, by which the greater part of the town of Torre del Greco was destroyed. The violent eruption of 1822 has been alluded to above. A remarkable eruption occurred 1855, May. In 1365 began a series of eruptions, which have been repeated at intervals since. For full account of the fearful outbreak of 1872, Apr., we are indebted to Palmieri, director of the Meteorological Observatory on Mount Contaroni, a part of V., who with great courage remained in the observatory while it seemed threatened with destruction. An eruption

equal in brilliancy to that of 1872, but much less destructive, took place 1878; another 1880.—A wire-rope railway to the top of Vesuvius was opened 1880, having two lines of rails, so that while one carriage goes up, the other comes down: it extends to within 450 ft. of the mouth of the crater. Another fearful eruption, said to be the greatest since that of A.D. 79, occurred in 1906, during the first part of April, and lasted for a period of ten days. A number of towns and villages, clustering on the sides of the mountain, were covered to a considerable depth by ashes and burning lava, and it was estimated that more than two thousand lives were lost. The destruction of property was also very great, nearly all of the towns and houses on or near the mountain suffering to a greater or less extent. Most of the habitations, even those which were out of the line of actual danger, were abandoned by their terrified occupants, who fled to the seashore or other places of safety. The flow of lava, however, was more languid and less overwhelming than on the occasion of the destruction of the Roman cities in 79, and this fact afforded the inhabitants better opportunities for escape. In many instances the peasants were given time to pack their effects into carts or on the backs of donkeys, and escape out of harm's way. Streams of lava reached the ancient site of Pompeii, and ashes fell in such quantities in Naples, twenty miles away, as to crush the roofs of residences and public buildings. In numerous instances the streets of Naples and other towns in the vicinity were filled to a depth of several feet with ashes, which had to be removed like a heavy fall of snow, in order to make way for the passage of street cars and vehicles. The whole face of the country for miles around was covered with a thick coating of black ashes, in many places to a considerable depth. The disturbances were marked especially by the opening of new craters, by tremendous earthquake shocks, by the hurling of great white-hot rocks thousands of feet into the air, and by electrical activities of the most frightful character. Great streams and rivers of lava burst forth from the rent mountain and flowed down its sides, illuminating the darkness with its red heat, and licking up every combustible thing that came in its way. One of these streams was more than five hundred feet in width, and in its course down the mountain it destroyed the Funicular Railway and the great hotel which stood near the crater. It likewise rent away and consumed a portion of the royal observatory; but the director, Dr. Matteucci, like Palmieri in 1872, remained steadfastly at his post, and although in momentary peril of his life calmly recorded the phenomena as they occurred around him, thus adding vastly to the scientific knowledge of the eruptions by personal observation. His subsequent descriptions of his experiences were thrilling in the extreme. One of the most terrifying features of the spectacle, he declared,

THE CRATER OF VESUVIUS, NAPLES.

'was the unusual extent of the electrical phenomena, the darkness being broken by vivid flashes of lightning, giving the sky a blood-like color, with short, heavy peals of thunder interspersed. . . . Observation was extremely difficult under such disturbing conditions. The seismic instruments were badly affected by the electrical intensity, each explosion being announced by a violent movement of the instruments, which seemed ready to burst into pieces.' Another eye-witness described the scene as so terrifying and awful as to exceed the powers of adequate description. The whole summit of the mountain was wreathed with flames, accompanied by a continuous and frightful roar as if the very bowels of the earth were about to be rent asunder. At frequent intervals the cone of the volcano was encircled with vivid electrical displays, in the midst of which the downpour of liquid fire could be seen in all its terrifying splendor. In the evening of the 7th of April there was a frightful shock of earthquake, which was repeated at 2 o'clock the following morning, when instantly the volume of the lava streams was more than doubled as they swept with accelerated speed down the face of the mountain. The awful spectacle seemed to inspire the trembling inhabitants with a frenzy of terror, and they fled precipitately toward the sea. Perhaps the most startling phenomena of the eruption was the blowing off of the top of the mountain, until its height was reduced by more than seven hundred feet and its whole contour completely changed.

For several years preceding this outburst Vesuvius had manifested more or less activity and violence. On the 7th of October, 1902, after a considerable period of quiet, it suddenly burst into eruption, but subsided without doing any great amount of damage. This was the year, it will be remembered, in which St. Pierre, on the island of Martinique, was destroyed by the eruptions of Mont Pelee, and when the whole internal organism of the earth seemed to be in commotion. Between that time and the catastrophe of 1907 there were several more or less ominous convulsions, until at length the mountain burst into the frightful paroxysms of 1906.

VESZPREM, *vĕs'prĕm* (Ger. *Weiszbrunn*): town in w. Hungary, 65 m. s.w. of Budapest. It contains a handsome episcopal palace, a fine cathedral, a Piarist college, and a gymnasium. Cloth and flannel weaving, silk-spinning, cultivation of wine, fruits, and tobacco, are principal industries. The town has been on several occasions in the possession of the Turks; and an interesting memorial of them is a slender minaret, rising from an old Gothic tower, and which now serves as a watch-tower against fire.—Pop. about 26,000.

VETCH, n. *vĕch* [F. *vesce;* OF. *veche, vesse*—from L. *vicĭa*, a vetch: It. *veccia*]: a leguminous plant with herbaceous stem, belonging to the genus *Vicia* (to which

the *bean* also is referred) and sub-order *Papilionaceæ*, used for green fodder; the wild pea. VETCH'Y, a. *-ĭ*, consisting of vetches or of pea-straw; covered with vetches. VETCH'LING, n. a little vetch (see LATHYRUS): see also FITCH.—*Vetches* have a tuft of hairs on the style beneath the stigma, nine stamens united, and one free; and mostly are climbing annuals, with pinnate leaves ending in tendrils, and with no terminal leaflet. The Common Vetch (*V. sativa*), sometimes called by agriculturists TARE, frequent in cultivated ground in Europe, and itself cultivated as green food for cattle, has rather large purple, blue, or red flowers in pairs, axillary and almost sessile. In cultivation, it varies considerably in size and other particulars, e.g., in breadth of the leaflets, number of them in a leaf, etc. Oats are generally sown with it, to afford it a little support, and thus prevent its rotting in wet weather. It is an immigrant in the United States, both the common form and a narrow-leaved variety, and two other European species, with long peduncles and small flowers, are found here, mostly near the Atlantic coast.—*V. Cracca* and *V. sepium* are very common Brit. species, the former with many-flowered stalks, bearing beautiful bluish-purple flowers, a beautiful climbing plant, and a chief ornament of trees, hedges, and bushy places in the latter part of summer. These and other species, natives of different parts of Europe and n. Asia, have been recommended for cultivation, and generally agree with the Common Vetch both in their qualities and in the mode of cultivation which they require: *V. biennis* and *V. Narbonnensis* are among those chiefly cultivated in parts of Europe. The species of *Vicia* are very numerous, chiefly in temperate parts of the n. hemisphere.—Our native species are perennials, with blue or purplish flowers, except one (*V. Caroliniana*) with whitish flowers, the keel tipped with blue. For Bitter Vetch, see OROBUS.

VETERAN, a. *vĕt'ĕr-ăn* [F. *vétéran*, a veteran—from L. *vetĕrānus*, old, experienced—from *vetus*, aged, old: It. *veterano*]: grown old in service; experienced; long exercised, particularly in military life: N. one long exercised in any service, particularly that of war. VETERAN CORPS, old soldiers enrolled as military reserves for garrison-service, etc., in an emergency.

VETERINARY, a. *vĕt'ĕr-ĭ-nā-rĭ* [F. *vétérinaire*, veterinary—from mid. L. *vetĕrinārĭūs*, a cattle-doctor—from L. *vetĕrīnæ*, draught cattle or beasts of burden—probably from *veho*, I carry: It. *veterinario*, veterinary]: pertaining to domestic animals and their medical and surgical treatment. VET'ERINA'RIAN, n. *-nā'rĭ-ăn*, a surgeon who treats the diseases of domestic animals, generally called a VETERINARY SURGEON.

VET'ERINARY MEDICINE: medical management and treatment of domestic animals. Veterinary medicine

appears to have been studied by the ancient Egyptians, as well as by the Greeks and Romans. Hippocrates contributed a treatise on equine disorders; Columella and Vegetius (the latter about A.D. 300) left several curious veterinary works. Until after the middle of the 18th century there were no schools for teaching veterinary medicine. The works published in France, Italy, etc., were of little value. In Britain, Blundeville and Gervase Markam, in the reign of Elizabeth, published vols. on farriery; Snape, farrier to Charles II., produced an anatomical treatise on the horse; Gibson, previously surgeon in a cav. regt., about the middle of the 18th century published *The Farrier's Guide*, for many years the best authority on the subject. The treatment of sick horses remained, however, in the hands of the riding-master, the groom, or the shoeing-smith or farrier; while the treatment of the other domestic animals devolved on the goat-herd, shepherd, or cow-leech.

Veterinary medicine as a scientific art takes date from 1761, when the first veterinary college was established at Lyons, France, with royal patronage, under Bourgelât. Five years later, the flourishing school of Alfort, near Paris, was founded; 1791, Feb., the London College was organized. In Scotland, Dick, 1823, began systematic teaching of veterinary medicine; he erected college buildings in Edinburgh, with hospital for sick animals, collected a valuable museum, and engaged efficient assistants to instruct his pupils in anatomy and physiology, chemistry and materia medica, cattle-practice and histology. At his death Dick bequeathed to the city of Edinburgh his college and his entire fortune, to be devoted to the teaching and improvement of veterinary medicine.

In 1844, a royal charter was granted, under which veterinary surgeons (graduates of either the London or Edinburgh College) became a corporate body, entitled 'The Royal College of Veterinary Surgeons': this college has authority to appoint examining boards, to grant diplomas or licenses to practice, and to grant the higher title of fellow to eminent members of the profession. By the act of 1881 this college provides for examination of students from Brit. veterinary colleges, and for conferring diplomas on those qualified. In many English towns and districts there are veterinary practices worth £600 to £1,000 a year; while a few exceed that amount.

In the United States the number of educated practitioners is rapidly increasing. The first charter for a college of instruction in veterinary medicine in the United States was secured in Pennsylvania 1853, but no organization was effected. The first establishment of the kind to go into operation was the New York College of Veterinary Surgeons, chartered 1857. The American Veterinary College is an offshoot from this institution. Some of the agricultural colleges have professorships of

veterinary medicine; and investigations in this line are carried on by many of the government experiment stations—special attention being given to hog-cholera, Texas fever, tuberculosis, and kindred diseases.

Among leading writers on veterinary medicine are: Armatage, *Every Man His Own Cattle Doctor,* also, *Every Man His Own Horse Doctor;* Ashmont, *Dogs: Their Management and Treatment in Disease;* Fleming, *Animal Plagues;* Gamgee, *Domestic Animals in Health and Disease;* Gresswell, *Diseases and Disorders of the Ox,* also, *Manual on the Theory and Practice of Equine Medicine;* Law, *Farmer's Veterinary Adviser;* Liautard, *On the Lameness of the Horse;* Robertson, *The Practice of Equine Medicine;* Tellor, *Diseases of Live Stock;* Williams, *Principles and Practice of Veterinary Medicine,* also, *Principles and Practice of Veterinary Surgery.* Many of the standard works on the various classes of live-stock incidentally treat of the diseases of animals, and numerous agricultural and live-stock journals have special departments for this subject.

VETHAKE, *vĕth'ak,* HENRY, LL.D.: educator: 1792-1866, Dec. 17; b. Demerara. Coming to the United States with his parents, he entered Columbia College, New York, graduated 1808, and studied law. He became teacher of mathematics in Columbia 1813, and the same year professor of mathematics and natural philosophy in Rutgers (then Queen's) College; held a like chair at Princeton 1817-21, at Dickinson College 1821-29, and in the University of the City of New York 1832-35. He then was for a year president of Washington College, Lexington, Va. He was professor of mathematics 1836-55, and 1855-59 professor of intellectual and moral philosophy in the University of Pennsylvania; and was chosen vice-provost 1846, provost 1854. From 1859 till his death he was professor of the higher mathematics in the Philadelphia Polytechnic College. He published *Principles of Polit. Econ.,* and edited McCulloch's *Dic. of Commerce.*

VETIVER, *vĕt'ĭ-vẽr,* or CUS'CUS: dried roots of an E. Indian grass (*Andropogon muricatus*) which has a very agreeable and persistent odor, something like sandal-wood; used to perfume linen, etc. Baskets, fans, and mats are made of it in India; it yields its perfume for many years, and it is strongest when moistened.

VETO, n. *vē'tō,* VE'TOES, n. plu. *-tōz* [L. *veto,* I forbid]: the right possessed by the executive power of a state, as by a king, a president, or a governor, to negative the laws or propositions passed or promoted by the legislative assemblies of the state; a similar right possessed by one legislative assembly over another: any authoritative prohibition: V. to forbid or disallow; to withhold assent to, as to a law. VE'TOING, imp. VE'TOED, pp. *-tōd.* VE'TOIST, n. *-tō-ĭst,* one who exercises a veto;

one who maintains the right of veto. VETO ACT, in Scottish Ecclesiastical Law: see PATRONAGE: SCOTLAND, CHURCH OF.—The Veto may be absolute as in England, or qualified as in the United States, where the disapproval of the executive may be overridden by an extraordinary majority of the legislature or suspensive as in France, where the veto merely works a suspension of the law until re-passed by the legislature by an ordinary majority. In England the veto is a remnant of the more extensive legislative power formerly exercised by the sovereign, but which has been gradually cut down until only the negative power of disapproval is left. Since 1708 the right has never been exercised and the commentator Bagehot goes so far as to say that the sovereign would be bound to sign his own death warrant if the two houses of Parliament should send it to him. But the better opinion is that a royal prerogative is never lost by non-user and therefore the royal veto power still exists unimpaired, although the system of responsible cabinet government makes its use out of place. In the English colonies of America, except Maryland, Rhode Island and Connecticut, the royal veto was frequently employed in a manner to call out the strong protests of the colonies, and this abuse was one of the well known counts in the indictment of the British king contained in the Declaration of Independence. None of the revolutionary State constitutions except Massachusetts gave the executive even a qualified veto, nor was any provision for such a power made in the Articles of Confederation. The advantages of a qualified veto, as a check upon hasty and ill considered legislation, however, appealed to the framers of the Federal Constitution, and it was provided in Article I., Section 7, that every bill which shall have passed both houses of Congress shall be presented to the President for his approval, but if disapproved by him it shall be returned with his objections to the house in which it shall have originated. It is made obligatory upon the house to enter the objections upon the journal and proceed to reconsider the bill. If re-passed by two-thirds of both houses by a yea and nay vote it shall become law in spite of the executive disapproval. If the bill is retained by the President for a period of ten days (Sundays excepted) it shall become law without his signature unless the adjournment of Congress in the meantime prevents its return. This last proviso in effect gives the President an absolute veto on all bills passed during the last ten days of the session since he has only to retain them in order to nullify them. This potent weapon is known as the 'pocket veto' and was first extensively employed by President Jackson, who destroyed in this way Clay's bill for the distribution among the States of the proceeds from the sale of the public lands. The veto power was used rather sparingly by the earlier Presidents. Washington vetoed two, Jefferson and the two

Adamses none, Madison six and Monroe one. The most extensive use of the veto was made by Jackson, who vetoed twelve bills; by Tyler and Pierce, who vetoed nine each; by Grant, who vetoed forty-three; by Johnson, who vetoed twenty-one, and by Cleveland, who vetoed 301 during his first term. Most of those vetoed by Cleveland were private pension bills of little importance. Among the more important measures which have been killed by the executive disapproval were the bank bill and the internal improvement bill vetoed by Jackson, the two bank bills vetoed by Tyler, the Freedmen's Bureau, Civil Rights and Reconstruction bills vetoed by Johnson, the Inflation bill and the bill to reduce the President's salary from $50,000 to $25,000 vetoed by Grant, the silver coinage bill vetoed by Hayes and the Immigration bill vetoed by Cleveland. Until Pierce's administration but one bill was passed over the executive veto, the exception being a tariff bill vetoed by Tyler. Five were passed over Pierce's veto, four over Grant's, and fifteen over Johnson's. No bills became law by the operation of the ten-day rule until Buchanan's administration. During Grant's two terms 136 bills became law by this rule, eighteen during Johnson's term, thirteen during Arthur's, and 283 during Cleveland's first term.

Among the precedents which have grown up in connection with the exercise of the veto power are: that the President has no power to veto a resolution proposing an amendment to the Constitution; that he cannot veto a bill without stating his objections thereto; that he cannot recall a veto, although this was done on one occasion by Grant; and that the two-thirds of both houses required to override the veto means two-thirds of those present, and not two-thirds of all the members composing the two houses. An oft-suggested amendment to the Constitution is the proposal to empower the President to veto particular items in appropriation bills. This would enable the executive to eliminate objectionable 'riders' from important appropriation bills without destroying the entire bill and thus bringing certain departments of the government to a standstill. At the present time all the State executives except that of Rhode Island are allowed a qualified vote over the acts of the legislature. Not until 1902 were the executives of North Carolina and Ohio given this power. In four States (Vermont, Connecticut, New Jersey, and Indiana) it includes only the right to demand reconsideration. In twenty-seven States the veto may be overridden by two-thirds, either of the members present or elected; in three States, by three-fifths; and in the others, by a majority of those elected. In a considerable number the executive is empowered to veto any item of an appropriation bill, and in a few any section of other bills. Consult Mason, *The Veto Power* (1890).

VETTURA, n. *vĕt-tū'rā* [It. *vettura*—from L. *vectūra*,

a carrying or conveying—from *veho*, I bear or carry]: in *Italy*, a 4-wheeled traveling carriage. VETTURINO, n. *vĕt'tū-rē'nō*, or VET'TURI'NI, n. plu. *-nē*, in Italy, a hackney-coachman; one who lends coaches on hire, a traveler's guide.

VEUILLOT, *vĕh-yo'*, LOUIS: French journalist and author; 1813, Oct. 11—1883, Apr. 7; b. at Boynes en Gatinais (Loiret). He became a journalist, and his personalities involved him in duels. He visited Rome 1838, previous to which, he states, he was without much faith, religious or political. He returned to Paris a zealous adherent of the papacy; and, as editor of the *Univers*, soon signalized himself as an uncompromising champion of the church. In his renewed editorship of the *Univers* 1848, his polemical disquisitions called forth the censure of the archbishop of Paris, and in 1853 of the bishop of Orleans; and the *Univers* was suppressed by government 1861. Later it was replaced by the *Monde*, in which Veuillot discussed religious matters in a more temperate spirit. Ultimately Veuillot became an enemy of all progress, and a furious legitimist.

VEVAY, *vĕh-vā'* (Ger. *Vivis*): small town of Switzerland, canton of Vaud; remarkable for beauty of situation; on the n. shore of the Lake of Geneva, 11 m. e. of Lausanne. It stands at the mouth of the gorge of the Veveyse, where it opens on the lake. From the near elevations, the fine view to the e. commands the gorge of the Rhone, backed by the magnificent rampart of the Alps of Valais. In the Church of St. Martin (date 1438), Ludlow, one of Charles I.'s judges, and Broughton, who read to him his sentence of death, are buried. In the vicinity are many vineyards and orchards. Pop. 10,000.

VEX, v. *vĕks* [F. *vexer*, to vex—from L. *vexārĕ*, to harass, an intensive form of *vehĕrĕ*, to carry: It. *vessare*]: to irritate by petty provocations or annoyances; to harass; to disquiet; to distress; to fret; to toss to and fro; in *OE.*, to be uneasy. VEX'ING, imp. VEXED, pp. *vĕkst:* ADJ. debated; disputed, as a *vexed* question. VEX'ER, n. *-ĕr*, one who vexes. VEX'INGLY, ad. *-lĭ*. VEXATION, n. *vĕks-ā'shŭn* [F.—L.]: the act of disquieting or harassing; state of being disturbed in mind; great uneasiness; teasing or great troubles; the cause of trouble. VEXA'TIOUS, a. *-shŭs*, causing annoyance; teasing; full of trouble. VEXA'TIOUSLY, ad. *-lĭ*. VEXA'TIOUSNESS, n. *-nĕs*, quality of giving trouble and disquiet.—SYN. of 'vex': to tease; irritate; provoke; trouble; afflict; offend; displease; mortify;—of 'vexation': chagrin; agitation; mortification; trouble; grief; sorrow; distress.

VEXIL, n. *vĕks'ĭl*, or VEXILLUM, n. *vĕks-ĭl'lŭm* [L. *vexillum*, a military ensign or standard—dim. of *vēlum*, a veil]: in *bot.*, the upper or posterior petal of a papilionaceous or pea flower. VEX'ILLARY, a. *-lĕr-ĭ*, in *bot.*, applied to a form of æstivation in which the vexillum or

upper petal is folded over the other; also VEX'ILLAR, a. *-ĭl-lĕr.* VEXIL'LARY, n. a standard-bearer.

VIA, n. *vī'ă* [L. *via,* a way]: a way; a highway; often used adverbially in the ablative case (*viâ*) meaning by way of, as *viâ* Buffalo. VIA MEDIA, *-mē'dĭ-ă,* a middle course.

VIABLE, a. *vī'ă-bl* [F. *viable,* viable—from *vie;* L. *vīta,* life—from *vivo,* I live]: capable of living; likely to live, as a new-born child. VI'ABIL'ITY, n. *-bĭl'ĭ-tĭ* [F. *viabilité*—from L.]: capacity of living after birth; capability of living.

VIADUCT, n. *vī'ă-dŭkt* [L. *via,* a way; *ductus,* pp. of *ducĕrē,* to lead]: structure, usually open and arched on piers, a sort of extended bridge, for carrying a road or railway over a valley or deep depression; distinguished from an *Aqueduct* (q.v.) for conveyance of water over a hollow or valley. See BRIDGE; TUBULAR BRIDGE, ETC.

VIAL, n. *vī'ăl* [see PHIAL]: a small glass bottle. VI'ALLED, a. *-ăld,* contained in a vial or vials. See PHIAL.

VIA-LACTEA, n. *vī'â-lăk'tē-â:* in *astron.,* the galaxy or milky way. See GALAXY.

VIA-MALA, *vē'â-mâ'lâ:* remarkable defile or crevasse in the canton of Grisons, Switzerland; a portion of the Hinterrheinthal (see RHINE) between Thusis and Zillis. The sides of the cleft, which is about 2 m. in length, are immense walls of rock, almost parallel, and so hard that the disintegrating influence of the elements appears to have little effect on them, each projection on one side corresponding to an indentation on the other, almost as perfectly as at the time they were separated. The walls have a maximum height of about 1,600 ft., and at various parts of the defile are not more than 30 ft. apart at the top. The first part of this defile was long deemed inaccessible, and had received the name of the Lost Gulf, but in the early part of the 19th c. a magnificent road was constructed through the Via-Mala, 400 to 600 ft. above the river, by blasting and cutting a 'notch' in the side of the rock. The road is necessarily steep and narrow, crosses from side to side by three bridges, and is protected from falling stones and trees by a canopy of rock overhead here, and by a wooden roofing there. So narrow is the crevasse in some places that fallen trunks and stones are sometimes wedged in between its sides above the ordinary water-level; and on the occasion of the great flood of 1834, the river, generally 400 ft. below the second bridge, rose to within a few feet of it, and carried off the upper bridge.

VIAMETER, n. *vī-ăm'ĕ-tĕr* [L. *via,* a way; Gr. *metron,* a measure]: an Odometer (q.v.).

VIANDS, n. plu. *vī'ăndz* [F. *viande,* fresh meat—from mid. L. *vivanda* for *vivenda,* things needful for life, victuals—from L. *vivo,* I live]: provisions for eating; victuals; dressed meat; food; seldom used in the singular.

VIARDOT-GARCIA, Michelle Pauline: French opera singer, daughter of Manuel Garcia; b. Paris, 1821, July 18. She traveled extensively with her parents, and in 1839 made her début at London, playing in *Otello* and in *La Cenerentola.* She was married to Louis Viardot in 1840, but continued her operatic career until 1862, when she retired. She appeared in the great European cities with continued success throughout her stage life; created the parts of 'Valentine' in *Les Huguenots* and of 'Fidés' in *Le Prophète,* her voice, a mezzo-soprano of three octaves, enabling her to make an artistic triumph presentation of the roles; and after her retirement from the stage she engaged as a vocal teacher and in composition, in which her work is of importance. It includes the operattas *Le dernier sorcier* (1867); *Trop de femmes* (1869); etc., in addition to about 60 vocal melodies and other compositions.

VIAT'ICUM: a Latin word meaning provision for a journey, and used in the Roman Catholic Church to signify the Eucharist administered to patients beyond hope of recovery. Protestants also often take the Lord's Supper before death, but do not give this name to it.

VIAUD, Louis Marie Julien: French author, better known by his pseudonym Pierre Loti; b. Rochefort, 1850, Jan. 14. After a school education in his native town he entered the French navy in 1867, becoming midshipman in 1873, and resigning in 1898 with the rank of lieutenant. He has seen, in the course of his calling or otherwise, a great part of the world, and descriptions of foreign scenery figure largely in his works. He served with distinction in the Tonkin campaign, but incurred official displeasure by describing the cruel proceedings of French soldiers at Hué in a series of letters to the *Figaro* in 1883. In 1887 he was honored by admission into the Legion of Honor, and in 1891 was elected a member of the Academy, Zola being a rival candidate on the occasion. He has published many stories, tales, and sketches under the pseudonym 'Pierre Loti,' among them being: *Aziyadé* (1879); *Rarahu* (1880), reprinted in 1882 as *Mariage de Loti; Le Roman d'un Spahi* (1881); *Fleurs d'Ennui* (1882); *Pecheur d'Islande* (1886), his chief work; for which he received the Prix Vitet from the Academy; *Madame Chrysanthème* (1887); *Japoneries d'Automne* (1889); *Au Maroc* (1890); *Le Roman d'un Enfant* (1890); *Fantôme d'Orient* (1892), a sequel to *Aziyadé; Le Désert* (1894); *Jérusalem* (1895); *La Galilée* (1895); *Ramuntcho* (1897); and *Figures et Choses qui Passaient* (1898). Many of these have been translated into English. His works are in general of an exotic character, dealing predominantly with the East, which he had studied during his naval service.

VIBERT, Jean Georges: French painter: b. Paris, 1840, Sept. 30; d. there, 1902, July 28. He studied under Barrias and Picot and exhibited at the Salon for the

first time in 1863. His work was chiefly in oils, but he also possessed great skill in water-colors. His drawing was carefully accurate and he excelled as a technician, but his work is frequently marred by crude coloring. He founded the Société des Aquarallistes Français, was awarded medals at the Salon in 1864-7-8, and in 1882 became an officer of the Legion of Honor. Among his best-known works are: *Gulliver* (1870); *The Grasshopper and the Ant* (1875); *Monseigneur's Antechamber* (1876); *Apotheosis of M. Thiers* (1878); etc. He wrote: *La science de la peinture* (1891). There are four good examples of this artist in the New York Metropolitan Museum of Art.

VIBICES, n. plu. *vĭb-ĭ'sēz* [L. *vibex,* the mark of a blow or stripe, *vibīces,* plu.]: patches on the skin, varying in tint from bright red to violet, which occur in certain diseased conditions of the blood, especially in purpura. They are caused by minute hemorrhages of the capillaries of the true skin: known also as *ecchymosis;* called *petechiæ* when very small.

VIBORG, or WIBORG, *vē'borg:* oldest city in North Jutland, and one of the oldest in Denmark; capital of the province of Viborg; at the head of the Bay of Viborg, in the Gulf of Finland; at the mouth of the Saima canal (37 m. long), connecting the sea with Lake Saima, about 250 ft. above sea-level, and with a long series of navigable lakes northward. The castle (1293) was a center for establishing Christianity in Karelia, and a stronghold of Swedish power. Its cathedral, founded 12th c., was rebuilt 1726. Viborg, at which all the great highways of the interior converge, is important as a military post. The people are engaged in manufacture of woolen fabrics, leather, and tobacco. Pop. 16,000.

VIBRACULA, n. *vĭb-răk'ū-lă* [L. *vibro,* I shake]: long filamentous appendages found in many *Polyzōă.*

VIBRANT, a. *vī'brănt* [L. *vibrans* or *vibran'tem,* quivering; *vibrārĕ,* to quiver]: vibrating; trembling.

VIBRATE, v. *vī'brāt* [L. *vibrātus,* pp. of *vibrārĕ,* to set in tremulous motion: F. *vibrer*]: to move to and fro; to quiver, to oscillate; to cause to quiver; to sound tremulously; to tremble; to waver. VI'BRATING, imp. VI'BRATED, pp. VIBRATION, n. *vī-brā'shŭn* [F.—L.]: a tremulous motion; the act of moving or state of being moved one way and the other in quick succession; the tremulous motion produced in a body when struck, or disturbed by any impulse. VIBRATILE, a. *vī'bră-tĭl,* adapted to or used in vibratory motion. VI'BRATIL'ITY, n. *-tĭl'ĭ-tĭ,* the quality of being vibratile or vibratory. VI'BRATORY, a. *-tėr-ĭ,* vibrating; that shakes; that moves to and fro in quick succession; consisting in vibrations; also VI'BRATIVE, a. *-tĭv.* VIBRATILE ORGANS, hair-like organs of motion—termed also *cilia.* VIBRIO, n. *vī'brĭ-ō,* a name given to very minute thread-like animalcules.

VIBRIONIDÆ, *vī-brĭ-ŏn'ĭ-dē:* family of microscopic organisms, named from their darting and quivering motion. They are allied to the Bacteria (q.v.), from which they differ in being jointed. It has been debated whether they are animal or vegetable, but they are now classed with plants. See GENERATION, SPONTANEOUS; GERM-THEORY.

VIBRISSA, n. *vī-brĭs'sâ,* or VIBRIS'SÆ, n. plu. *-sē* [L. *vibrissæ,* hairs in the nose of man—from *vibro,* I shake]: one of the hairs found growing at the entrance of the nostrils, and other outlets; in the plural, the whiskers in cats.

VIBURNUM, *vī-bėr'nŭm:* genus of plants of nat. order *Caprifoliaceæ,* having a 5-toothed calyx, a 5-lobed, wheel-shaped, bell-shaped, or tubular corolla, 5 stamens, 3 sessile stigmas, and a one-seeded berry. The species are shrubs with simple leaves, and are numerous in the United States; including the Sweet Viburnum or Sheepberry, the Black Haw, the Arrow-wood, the Maple-leaved Arrow-wood, the Cranberry-tree, the Hobble-bush or American Wayfaring-tree, and other species. They are in general natives chiefly of n. parts of the world. *V. opulus* is the Guelder Rose (q.v.), or Snowball-tree, and *V. Laurustinus* the Laurustinus (q.v.), both common ornamental shrubs. *V. Lantana,* sometimes called the WAYFARING-TREE, is a native of warmer temperate parts of Europe and Asia, and is often planted as an ornamental shrub. It is a large shrub or low tree, with large elliptic serrated leaves, downy, with star-like hairs on the underside: the young shoots are very downy. The flowers are small and white, in large, dense cymes; the berries purplish black, mealy, and mucilaginous, with peculiar sweetish taste, disagreeable to many, but relished by some: they are useful in diarrhea and catarrh. Bird-lime is made from the roots in s. Europe. The inner bark is very acrid, and was formerly used as a vesicant. The wood is prized by turners. Tubes for tobacco-pipes are made of the young shoots.

VICAR, n. *vĭk'ėr* [F. *vicaire,* a vicar—from L. *vicārĭus,* that supplies the place of another, a substitute—from *vicis,* change, interchange: It. *vicario*]: one who performs the function of another; in the *Chh. of Eng.,* the incumbent of a benefice who receives only the smaller tithes or a salary. VIC'ARAGE, n. *-āj,* the benefice or residence of a vicar. VIC'ARSHIP, n. the office of vicar. VICARIAL, a. *vī-kā'rĭ-ăl,* pertaining to a vicar; vicarious. VICA'RIATE, a. *-āt,* having delegated power: N. a delegated office or power. VICA'RIOUS, a. *-ŭs,* acting in place of another; substituted in place of another. VICA'RIOUSLY, ad. VICAR-APOSTOLIC, in the *Rom. Cath. Chh.,* a missionary priest or bishop having powers direct from the pope. VICAR-GENERAL, in the *Eng. Chh.,* an assistant of a bishop or archbishop, having full authority over the diocese. VICAR OF JESUS CHRIST, the pope, as assumed to represent Jesus

Christ on the earth.—A *Vicar* is the substitute, temporary or permanent, appointed to act in place of certain ecclesiastical officials, whether individuals or corporations —e.g., in place of the pope, a bishop, a chapter, a parish priest, etc. Vicars of the pope are called 'vicars-apostolic,' and are generally invested with episcopal authority in some place where there is no canonical bishop. A vicar of a bishop is either a 'vicar-general,' having the full authority of the bishop over all his diocese, or 'vicar-forane' [L. *foraneus*, from *foris*, abroad], whose authority is confined to a particular district, and generally otherwise limited. A 'vicar-capitular' is the person elected by the chapter of a diocese, during the vacancy of the see, to perform all the functions of a bishop, except that he is not competent to do any act of episcopal order, as ordination, confirmation, etc., and his power is restricted in some other ways. A parochial vicar is either perpetual, as in parishes anciently held *In Commendam* (q.v.), or held by religious corporations; or temporary, whose appointment may be recalled at pleasure, or after a fixed time. The name, in this sense, is sometimes given, especially in the Roman Catholic Church, to the assistant priest, or, as he is called in England, the curate, in a parish. For the functions of 'vicars-apostolic,' see IN PARTIBUS.

VICE, pref. *vīs* [F. *vice*—from L. *vĭcĕ*, instead of, in place of; *vicis*, change: It. *vice*]: denoting one who acts in place of another; denoting one who is second in authority, but holding the same title, as *vice-admiral* (see ADMIRAL), *vice-chamberlain* (see CHAMBERLAIN), *vice-chancellor*, *vice-president*, etc. VICE, prep. *-vī'sē*, used as a separate word before a proper name, and means 'in the place of,' as B *vice* C resigned—that is, B in the place of C, who has resigned. VICE VERSA, ad. *vī'sē vėr'sâ* [L. *versâ*, being turned]: the reverse; the terms being interchanged.

VICE, n. *vīs* [F. *vice;* Sp. *vicio;* It. *vizio*, vice—from L. *vitĭum*, a fault]: a blemish; an imperfection; fault; depravity or corruption of morals; the opposite of *virtue;* unlawful or immoderate indulgence which has become habitual; a fault or bad trick in horses; a defect; the fool of the old shows and moralities. VICIOUS, a. *vĭsh'ŭs* [F. *vicieux*, vicious—from L. *vitĭōsus*]: having a vice or defect; depraved; spiteful; malicious; wicked; corrupt; having an ill temper, as a horse. VI'CIOUSLY, ad. *-lĭ*. VI'CIOUSNESS, n. *-nĕs*, the state of being vicious; also VICIOSITY, n. *vĭsh'ĭ-ŏs'ĭ-tĭ*. VICED, a. *vīst*, in *OE.*, vicious; corrupt.—SYN. of 'vice': crime; sin; iniquity; fault; guilt; offense; misdeed; wrong; wickedness; injustice; injury.

VICE, n., or VISE, *vīs* [F. *vis*, a screw, a winding stair —from L. *vitis*, a vine—so named from a comparison to the tendril of a vine: It. *vite*, a vine, a screw]: a small iron or wooden press tightened by a screw, used for hold-

ing fast an object on which a person is at work, as in the process of filing, etc. (see VISE): in *OE.*, grip; grasp: V. in *OE.*, to draw by violence; to force or compress, as if by a vice.

VICE-ADMIRAL, n. *vīs-ăd'mĭ-răl* [*vice* 1, and *admiral*]: a superior officer of the navy next below an admiral (see ADMIRAL; FLAG-OFFICER). VICE-ADMIRALTY, n. the office of a vice-admiral.

VICE-CHAMBERLAIN, n. *vīs-chām'bėr-lān* [*vice* 1, and *chamberlain*]: officer of the British royal household immediately under the Lord Chamberlain (q.v.).

VICE-CHANCELLOR, n. *vīs-chăn'sĕl-ėr* [*vice* 1, and *chancellor*]: deputy or substitute of a chancellor; deputy or lower judge of a court of chancery or equity (see CHANCELLOR; CHANCERY, COURT OF); officer of a university who is employed to discharge the duties of the chancellor.

VICE-CONSUL, n. *vīs-kŏn'sŭl* [*vice* 1, and *consul*]: a subordinate officer to whom consular functions are delegated in some particular part of a district already under the supervision of a Consul (q.v.).

VICEGERENT, n. *vīs-jē'rĕnt* [L. *vĭcĕ*, instead of, and *gerens* or *geren'tem*, carrying; *gerĕrĕ*, to carry]: one who is deputed to exercise the powers of another: ADJ. having or exercising delegated power. VICEGE'RENCY, n. *-rĕn-sĭ*, office of a vicegerent; deputed power.

VICENNIAL, a. *vī-sĕn'nĭ-ăl* [L. *vīcēni*, twenty; *annus*, a year]: existing or continuing twenty years. VICENNIAL PRESCRIPTION, in the law of Scotland, the limitation which is put to certain actions after the lapse of 20 years.

VICENTE, GIL, *zhēl vē-sĕn'tā:* father of the Portuguese drama: b. latter part of the 15th c., whether at Guimaraes, Barcellos, or Lisbon, is disputed; d. 1557. He studied jurisprudence at the University of Lisbon; but his tastes soon drew him to poetry. His first poetical essay, a pastoral in Spanish, was favorably received at the court of Emanuel the Great: it was represented 1502, to celebrate the birth of the prince who became John III. He produced in all 42 pieces, of which 10 were in Spanish, 15 partly or chiefly so, and 17 in Portuguese. His fame spread beyond his own country, and Erasmus is said to have mastered Portuguese for the purpose of reading his works. At home, however, he had detractors, whom he sought to silence once at a party by composing impromptu, on a given proverb, the farce *Inez Pereira*, his best piece. Complaints in his works indicate that the court was not liberal enough to keep him from want in his later years. He has been called the Plautus of Portugal, and has historical importance as the founder of a national theatre in his country. In 1834 a complete reprint of his works was undertaken by Barreto Feio and Monteiro (3 vols., Hamb.).

VICENZA, *vē-chĕn'dzâ:* city of Italy, capital of province of Vicenza; at the confluence of the rivers Bacchiglione and Retrone, 42 m. w. of Venice by railway. The rivers are crossed by eight bridges, one of which, a bold single arch, is said to be the work of Palladio (q.v.), a native of the city, to whose genius it is much indebted for its beauty. Vicenza is surrounded by a moat, and walls half in ruins, is about 3 m. in circumference, is entered by 6 gates, and contains many fine palaces and churches. In the Piazza dei Signori, a remarkably fine square, is a lofty and slender campanile, 270 ft. high, and only 23 ft. wide. The Palazzo della Ragione is a handsome Gothic building, by Palladio. The Palazzo Prefettizio, by the same architect, is a rich and fanciful Corinthian edifice. The Duomo, built 1467, is Gothic; the nave is 60 ft. wide, and in certain of its chapels are noteworthy pictures. The Teatro Olimpico, whose scenery is fixed and represents a kind of piazza, with diverging streets of real elevation, but diminishing in size, is by Palladio. Vicenza is the seat of a bishop; and contains a lyceum, a seminary, and a picture-gallery, a library of 60,000 volumes, a hospital, and many other benevolent institutions. Manufactures of silk, linen, earthenware, paper, and velvet are carried on. The surrounding country, studded with mansion-houses, and rich in vineyards, is exceedingly beautiful.

Vicenza (anc. *Vicentia,* or, perhaps more correctly, *Vicetia*) is a very ancient city. An inscription records its existence B.C. 136; and it continued to be a municipal town of some importance till it was laid waste by Attila, A.D. 452. It revived under the Lombards, and became for a time, in the middle ages, an independent republic. Pop. (1901) 44,777.

VICE-PRESIDENT, n. *vīs-prĕz'ĭ-dĕnt* [*vice* 1, and *president*]: a person appointed beforehand to take the place of a president in certain contingencies; or, as in banks, railway and other corporations, to assist the president as do the heads of certain departments.—The *Vice-President of the United States* is, like the president, elected for four years. He presides in the senate, but, not being a senator, has no vote other than a casting-vote when the senate is equally divided. In case of the removal, death, resignation, or inability of the president, the vice-president becomes president—his place in the senate being filled by a president of the senate *pro tem.*, elected by the senate itself. Should both the president and the vice-president resign, die, or be removed, then, by chap. 4, acts of the XLIXth congress, the succession to the presidency devolves on the following officials, in the order named: the secretary of state; the secretary of the treasury; the secretary of war; the attorney-general; the postmaster-general; the secretary of the navy, and the secretary of the interior, etc.

VICEREGAL, a. *vīs-rē'găl* [*vice* 1, and *regal*]: pertaining to a viceroy.

VICEROY, n. *vīs'roy* [F. *vice-roi*, a viceroy—from L. *vĭcĕ*, instead of, and F. *roi;* L. *rex*, a king]: governor of a country or province ruling in the name and by the authority of the king; officer delegated by a sovereign to exercise regal authority in his name in a dependency; e.g., the lord-lieutenant of Ireland—who, however, is never officially so styled; the governor-general (or *Viceroy*) of India; the Khedive (q.v.) (or *Viceroy*) of Egypt. Viceroy was the proper official designation of the governors of Naples, Spain, and Peru, under the old Spanish monarchy. VICEROYALTY, n. *vīs-roy'ăl-tĭ*, office, dignity, or jurisdiction of viceroy; also VICE'ROYSHIP, n.

VICE-VERSA. See under VICE 1.

VICH, *vēk*, or VIQUE, *vēk:* city of Spain, in Catalonia, modern province of Gerona; on a hill-girt plain about 38 m. n. of Barcelona. Its cathedral, built about 1040, repaired and modernized about the end of the 18th c., is bold and elegant in the interior; and the Gothic cloisters are exceedingly rich and elegant. Corn, fruit, and a poor wine are the products of the vicinity; and the inhabitants are employed in weaving, and in manufacture of hats and paper. Vich, the Roman *Ausa*, was afterward called *Ausona* and *Vicus Ausonensis*, of the first part of which its present name is a corruption. Pop. (1901) 13,000.

VICHY, *vē-shē:* small town of the interior of France, department of Allier; on the Allier, in a fine valley, surrounded by hills clad with vines and fruit-trees; 35 m. s.s.e. of Moulins, 227 m. by rail s.s.e. from Paris. Vichy is the most fashionable bathing resort in France. The springs which rise at the foot of the volcanic mountains of Auvergne (q.v.) are the most efficacious alkaline springs known: they vary in temperature from 68° to 112° F., and are used for drinking and bathing, in cases of indigestion, chronic catarrh, gout, liver-disease, diabetes, and gravel.

The virtues of the *aquæ calidæ* of this place were known in Roman times, as is testified by the numerous remains of marble baths and coins of the times of Claudius and Nero that have been dug up; but their modern repute arose only in the 19th c. Pop. of town (1901) 11,000.

VI'CIA: genus of plants. See VETCH; BEAN.

VICINAGE, n. *vĭs'ĭ-nāj* [F. *voisinage*, neighborhood—from L. *vicīnus*, neighboring—from *vīcus*, a village. allied to Gr. *oikos*, a house: It. *vicino*, near]: the place or places adjoining or near; neighborhood. VICINITY, n. *vĭ-sĭn'ĭ-tĭ* [L. *vicinĭtas*, neighborhood]: nearness in place; neighborhood.

VICIOUS. See under VICE 3.

VICISSITUDE, n. *vĭ-sĭs'sĭ-tūd* [F. *vicissitude*—from

L. *vicissĭtūdo,* change, alternation—from *vicis,* change: It. *vicissitudine*]: regular change or succession of one thing to another; irregular change; mutation, as in human affairs. VICIS'SITU'DINARY, a. *-tū'dĭ-nĕr-ĭ,* or VICIS'SITU'DINOUS, a. *-dĭ'nŭs,* characterized by change or revolution; full of vicissitude.

VICKSBURG, *vĭks'bĕrg:* Miss.; city, county-seat of Warren co.; on the Mississippi river, a few miles below the mouth of the Yazoo river, and on the Alabama & V., the Vicksburg, S. & P., and the Illinois C. railroads; about 43 m. w. of Jackson, the capital of the state, and 230 m. n.w. of New Orleans. The city has regular steamboat connections with all the important Mississippi river ports. It is in an agricultural region in which cotton is one of the principal products. It is on a high bluff overlooking the river, and the streets, though not broad, are regular, well-kept, and have a number of shade trees. The chief manufacturing establishments are cottonseed-oil mills, planing mills, railroad shops, foundries, and machine shops. In 1900 (government census) there were 65 manufactories with a combined capital invested in plants of $1,360,890; and employing 1,222 persons, to whom were paid annually $532,734. The cost of raw material was $949,387, and the annual value of the products was $1,876,843. The city has an extensive trade in cotton and lumber products, and general produce.

The principal public buildings are the government building, the county court-house, the Charity Hospital, the churches and schools. The educational institutions are a public high school, Saint Aloysius College (R. C.), for boys, Cherry Street College (colored), founded in 1892, Saint Francis Xavier's Academy, public and parish schools for both races, and school libraries. There is here a National Cemetery which contains 16,727 graves, of which 12,723 are of unknown dead. The eight banks have a combined capital of $615,000. The government is vested in a mayor and board of aldermen, consisting of eight members.

Vicksburg was laid out as a city on the plantations of John Lane and William Vick. In 1840 it was incorporated. It soon became a prominent distributing center for the interior towns and a shipping point for the products of the plantations. It came into great prominence during the civil war (see VICKSBURG, CAMPAIGN AND SIEGE OF). The city suffered some damages in 1876, when the river cut through a neck of land. The government has since expended about $2,000,000 in efforts to divert the Yazoo river, and also to restore the harbor. Pop. (1900) 14,834; (1910) 20,814.

VICKS'BURG, SIEGE OF: investment of that town by the Army of the Tennessee under Gen. Ulysses S. Grant; resulting in the surrender of the place 1863, July 4. Early in the war the strategic importance of the place was recognized, and Vicksburg was strongly fortified by

SIEGE OF VICKSBURG, REPULSING A FEDERAL SORTIE.

the Confederates. The U. S. government found its capture necessary for the control of the Mississippi river; and immediately after the battle of Corinth, Gen. Grant began the movement on Vicksburg, and 1862, Dec. 29, was at Young's Point, on the Mississippi, 3 m. above the town, with 50,000 men, while Admiral Porter was ready to co-operate with a fleet of gun-boats. But circumstances delayed the actual siege till May 18, when, having defeated Gen. Joseph E. Johnston, whose headquarters were at Jackson, Miss., Gen. Grant, after repeated encounters, compelled Gen. Pemberton to retire within the fortifications of Vicksburg, and the lines of investment were drawn and fortified. At that date, the Confederate army under Johnston, in Grant's rear, numbered about 30,000 men, and Pemberton's force in Vicksburg, was somewhat larger. Grant's army numbered 71,000. Vicksburg was defended on the river-front by 30 pieces of the heaviest artillery and 13 field-pieces. On the land side were batteries at intervals of 200 yds.; the parapets were 10 ft. high, 25 ft. thick, and the ditch 7 ft. deep. Grant had in position, June 30, 220 field-pieces and a battery of heavy naval guns. The right of the line of investment was held by Gen. Sherman; next was Gen. McPherson; then Gen. McClernand held the left; the extreme left was held by Gen. Lauman. Grant's headquarters were at the n.e. angle, where the corps of Sherman and McPherson touched: the line was 15 m. long. An assault was made by the besiegers after exploding a mine June 25, but it failed. Another mine was sprung July 1, but without effect. Pemberton's supplies were failing, and dispatches that were captured showed that Johnston meditated an attack on Grant's rear, thus to afford Pemberton an opportunity to escape from the besieged town. That scheme was foiled, as was also Pemberton's plan of escaping across the river in boats. July 3 Pemberton asked for an armistice to arrange terms of capitulation; but Gen. Grant would listen to no proposition short of unconditional surrender. The Confederate commander perforce accepted Gen. Grant's terms —surrender of the town, the army, and war material; the men to be released on parole not to take arms till exchanged. July 4 the Confederate army marched out and laid down their arms, then returned to the city, and Gen. Logan's division entered and took possession. 27,425 men and 2,166 officers were paroled; 790 men refused to give the parole and were held as prisoners of war.

VICO, *vē'ko*, GIAMBATTISTA (or GIOVANNI BATTISTA): jurist, philosopher, and critic: 1668, June 23—1744, Jan. 20; b. Naples; son of a bookseller. He was educated by the Jesuits, and afterward studied for the bar. Weak health prevented him from following his profession; and after nine years he obtained the chair of rhetoric in the University of Naples. In 1735 he was appointed historiographer to the king of Naples. As he married early,

and had a large family, his life was passed in poverty; and it was, moreover, embittered by family troubles, and by constant ill health. The great work which has made his name illustrious, the *Scienza Nuova,* appeared 1725; but it was completely recast in an edition 1730, with the effect of making it more imposing as a system, at the expense of a great loss of clearness. A third edition, enlarged, was published shortly after the author's death. In the *Scienza Nuova,* Vico brought together, and attempted to fuse into a system, opinions which he had previously advanced in separate treatises. The slowness of the work in gaining its proper place in European literature must be attributed largely to its obscure and enigmatical style. Much of the obscurity arises from an uncouth terminology, which the author often leaves unexplained, and (in the later and authoritative editions) from rigorous application of the deductive method to subjects which do not always admit of it. The *Scienza Nuova* was virtually unknown out of Italy 1822, when a German translation of it appeared at Leipzig. It was, a few years later, translated into French (with some curtailment) by Michelet (*Principes de la Philosophie de l'Histoire, traduits de la 'Scienza Nuova' de G. B. Vico;* Paris, 1827); and Vico has since found his proper rank among the most profound, original, and ingenious of modern thinkers.

The *Scienza Nuova* (*De' Principj d'una Scienza Nuova d'interno alla Comune Natura della Nazioni*) may be described as a *Novum Organum* of politico-historical knowledge. Observing, amid the infinite variety of thoughts and actions, of language and manners, which the history of nations presents, a constant recurrence of the same characteristics, and, in the political changes which peoples the furthest removed from each other in time and place have passed through, an essential similarity of development, Vico proposed to himself the task of distinguishing amid social phenomena the regular from the accidental; of finding out the laws which govern the formation, the growth, and the decay of all societies; in fine, of tracing the outlines of the universal, the ideal history of society—the idea of which he himself believed to have existed from eternity in the mind of God. In doing this, he attempted, by historical criticism on the widest basis, to illustrate the interdependence of all the sciences; to show that the progress of each is related to that of all, and the progress of all of them dependent on, while also acting powerfully on, the general condition of society. And while holding that the actual state of every society is the result of a free development of the human faculties, he attempted to give a historical demonstration of the existence of a Divine Providence directing the career of nations, overruling the designs which men propose to themselves; operating, however, not by positive laws or arbitrary interferences, but by methods and expedients

to which men freely resort—i.e., God's providential governance of nations is not by continued miracle, but, like His rule over nature, by natural laws. It has been said that the *Scienza Nuova* includes a system of social (as distinguished from natural) theology—a demonstration of God's government of the world, and of the laws in which that government consists. Vico, in these inquiries, accepted from Descartes the individual consciousness as one of the criteria of truth; but he employed another also—the collective consciousness, or the common sense of mankind—the accord of the race, as it may be gathered from history—in a word, authority.

It would be difficult to overrate the ingenuity and originality of many of the inquiries into which Vico was led by the attempt to delineate the ideal history of society; and he has rarely failed to express views rational and probable compared with those accepted among his contemporaries. With admirable insight, he has not seldom hit on the conclusions to which increased social knowledge and more scientific conceptions have conducted inquirers in later generations. Thus, in clearing the ground for the foundation of his system, he was led to precisely those views about Homer and the authorship of the Homeric poems which are popularly associated with the name of Wolf; and to anticipate the general view of the credibility of early Roman history which was elaborated by Niebuhr. (See also COMTE, the germs of many of whose speculations are in Vico.) The beginnings of religion, the origin of poetry and language, the commencement of society (which he ascribes to the influence of a common religious belief and worship), the foundation of the privileges of the heroic or aristocratic class, are among the earlier subjects of his speculation. He proceeds to trace the origin of jurisprudence, and to show how its development has been dependent on social changes; and he afterward deduces from the history of ancient societies, and in some degree from the history of the governments which sprang out of the ruins of the Roman empire, the laws which govern the progress, the conservation, and the decay of nations. A monarchy, with an equality of civil and political rights as between subjects, was his ideal of good government for advanced societies.

Vico's theory as to the *law of cycles* in history—the movement being similar in different nations, and the path in successive periods also being similar through recurrence of the same forces—has been misunderstood as a positive denial of actual or possible advance. But he simply does not deal with the problem of the laws governing the advance of the race; and his historic cycles may easily be conceived of as following each a path *similar* throughout to that of each preceding, yet with one continuous upward movement as with a slow spiral ascent. This law, however, he does not develop.

Though he ascribed to religion a paramount influence

in forming and in conserving society, and though it was one of his principal objects to demonstrate the divine government of the world, Vico did not escape the suspicion of having written in a spirit of hostility to religion. It was alleged that he had written so obscurely, as he often did, through the fear of incurring ecclesiastical censures. Some critics of another school charged him, with at least equal plausibility, of having striven, both in his particular doctrines and in his consecration of the principle of authority, to satisfy the Roman Catholic Church. The cavils on either side are little deserving of attention; and it is pleasant to know that Vico, though not unconcerned about the accusations against him, felt in his later years consoled for the many trials and disappointments of his life, by the completion of a work whose greatness he knew better than any of his contemporaries. In 1818 the Marquis de Villa Rosa published a collection of the whole of Vico's works (2d ed. 1835). See Flint's *Vico* (1884).

VICTIM, n. *vĭk'tĭm* [F. *victime*—from L. *victĭma, the* beast for sacrifice: It. *vittima*]: a living being, sometimes human, but usually a beast, sacrificed to some deity; a person or thing killed, injured, or made to suffer in the pursuit of some object, or in consequence of disease, disaster, or the like; hence, one who is duped or swindled by another. VIC'TIMIZE, v. *-īz*, to sacrifice or destroy in pursuit of some object; to cheat; to deceive. VIC'TIMIZING, imp. VICTIMIZED, pp. *-īzd*.

VICTOR, n. *vĭk'tėr* [L. *victor*, a conqueror—from *victus*, conquered; *vincĕrĕ*, to conquer: It. *vittore*]: one who wins or gains the advantage in a contest or struggle of any kind, especially in war; one who defeats an enemy in battle: ADJ. conquering; victorious. VICTORIOUS, a. *vik-tō'rĭ-ŭs* [L. *victorĭōsus*]: conquering; superior in contest; that produces victory; triumphant. VICTO'RIOUSLY, ad. *-lĭ*. VICTO'RIOUSNESS, n. *-nĕs*, state or quality of being victorious. VICTORY, n. *vĭk'ter-ĭ* [L. *victōrĭa*]: conquest; superiority over an enemy; success in any contest; a triumph. VICTORIA, n. *vĭk-tō'rĭ-ă*, a low four-wheeled carriage with a calash top, affording accommodation for two persons in addition to the box or driver's seat; in *astronomy*, an asteroid discovered in London by Hind 1850; a genus of *Nymphæacĕæ* or Water-lilies, comprising only one species, *V. regia* or 'royal water-lily' (see below). VICTORINE, n. *vĭk'tō-rēn*, a small tippet of fur worn by women. VICTORESS, n. *-tėr-ĕs*, or VIC'TRIX [L.], n.*-trĭks*, or VIC'TRESS, n. *-trĕs*, a female victor. VICTORIA CROSS, decoration, accompanied by a pension, granted in the British army and navy for acts of distinguished valor (see CROSS, VICTORIA).

VICTOR, *vēk-tor'*, CLAUDE PERRIN, Duke of Belluno, and Marshal of France: 1764, Dec. 7—1841, Mar. 3; b. La Marche, dept. of Vosges. At the age of 17 he enlisted as a drummer in a regiment of artillery. He received his

discharge after 10 years of service as a common soldier; but re-enlisted 1792, and having attracted the attention of Napoleon by his able conduct at the siege of Toulon 1793, was promoted to brigadier general. In the Italian campaigns of 1796-7 and 1799-1800, he commanded the vanguard, and rising to the opportunities which Napoleon's estimate of him gave, evinced great skill and extreme daring. At Marengo he maintained such an obstinate resistance for eight hours to the overwhelming numbers of the enemy, that the expected reinforcements had time to arrive, and to convert the imminent victory of the Austrians into their crushing defeat. Having risen to general of division, he commanded 1806 with distinction a *corps d'armée* in the Prussian and Russian campaigns; and though captured 1807 by Schill's partisans, he was exchanged (for Blücher) in time to win, on the bloody field of Friedland, the baton of a marshal of the empire. As governor of Prussia, he gained the esteem of the Prussians by his dignity and moderation; and 1808 he was created Duke of Belluno, sent to command the first *corps d'armée* in Spain. Here he gained several victories, notably over Klake at Espinosa, and Cuesta at Medellin; but was defeated by Wellington in the obstinate battle of Talavera (q.v.), and again by Sir Thomas Graham at Barosa (q.v.). After a fruitless blockade of Cadiz, he was recalled to command the ninth *corps d'armée* in the Russian campaign of 1812. When the allies, in overwhelming numbers, were closing round France, Victor appeared prominently in the fore-front of the defense, made a gallant stand at the passes of the Vosges, and retook Saint Dizier and Brienne at the point of the bayonet; but his arriving too late (1814, Feb.) to occupy the bridge of Montereau was a fault which Napoleon could not pass over, and after a scene of violent recrimination Victor was deposed in favor of Gérard (q.v.). Notwithstanding this disgrace, he continued with the army, and proved his zeal at the battle of Craonne. A severe wound which he there received brought his military career to a close; and in disgust at Napoleon's treatment he transferred his allegiance to the Bourbon dynasty, and became a violent accuser of his former master. Victor's servile loyalty to Louis XVIII, gained him a peerage and other honors; but his zeal as president of the military commission appointed to try those of his old companions in arms who had deserted to Napoleon during the 'Hundred Days,' brought upon him merited obloquy. He was minister of war 1821-23; second in command in the Peninsula 1823; and afterward appointed ambassador to the court of Vienna, which refused to receive him unless he laid aside his ducal title. After the revolution of 1830 he retired from public life. He died at Paris.

VICTOR-AMADEUS, *vĭk'tor âm-a-dē'ŭs*, I., Duke of Savoy: (ruled 1630-37): d. 1637; son and successor of

Charles-Emmanuel the Great. He carried on the inherited war with France; but 1631 he was forced to surrender Pignerol, La Perouse, Angrone, and Luzerne to France, in exchange for Montferrat and Alba. He gave attention to the internal improvement of his dominions, and re-established the University of Turin on an extended scale; but the irresistible pressure exercised on him by Richelieu, forced him into a war with the Spaniards in Italy; and after routing his opponents at Tornavento (1636) and Montebaldone (1637), he died at Vercelli.

VICTOR-AMADEUS II., Duke of Savoy: 1666, May 14—1732, Oct. 31 (ruled 1675-1730); grandson of Victor-Amadeus I. He was an able prince and an energetic administrator. In 1684, Victor married Anne-Marie of Orleans, niece of Louis XIV., and daughter of Henrietta of England; but the overbearing insolence of the 'Grand Monarque,' who forced him to persecute the Waldenses (q.v.), and arrogantly ordered him to contribute an auxiliary force to the French army, and give up the citadel of Turin, drove him into a league with Austria and Spain against France. In revenge, a French army under Catinat assailed Victor's dominions, and though he was reinforced by 4,000 Austrians under his relative, Prince Eugene, the allies were routed at Staffarda (1690, Aug.), and the victorious Catinat completed the reduction of Savoy and Nice before the winter of 1691. The duke, aided by considerable reinforcement from Austria and Spain, gallantly maintained the contest; but a second and more disastrous defeat at Marsaglia (1693, Oct. 4), where he left 10,000 dead on the field, put almost the whole of Piedmont at the mercy of the French. The war, however, continued; the duke's obstinacy and almost romantic daring balancing Catinat's military genius; till in 1695 Victor-Amadeus accepted favorable proposals of peace which detached Savoy from the grand alliance. In the war of the Spanish Succession (q.v.), Victor took part with France (1700) and was appointed commander-in-chief of the combined armies of France and Spain; but though he was aided by the counsels of his old opponent Catinat, the Austrians under his former ally Prince Eugene, defeated him at Chiari (1701, Nov.). In 1703 the tempting offers of Austria and Britain induced him to abandon France, and join the alliance against her. The French were routed by the duke and Prince Eugene under the walls of Turin, 1706, Sept. 7. In 1713 by the treaty of Utrecht (q.v.) Duke Victor-Amadeus was rewarded by receiving the rest of Montferrat, Val-Sesia, Lomellino, and the island of Sicily, with the title of king; besides being acknowledged as heir to the Spanish throne, in case of the failure of the Bourbon dynasty. In 1720, Charles VI. of Spain persuaded him to surrender Sicily in exchange for Sardinia—an exchange which in later times proved most fortunate for the House of

Savoy. The latter portion of Victor's long reign was employed in improving the administration, replenishing the exhausted treasury, encouraging agriculture and industry, and advancing education. In 1730, the king abdicated in order to marry the Countess of San Sebastian, but attempting at her instigation in the following year to resume the crown, he was arrested and imprisoned, and soon afterward died.—His grandson VICTOR-AMADEUS III. (ruled 1773-96) was compelled by Napoleon's victories to cede Savoy and Nice to the French republic.

VICTOR-EMMANUEL, *vĭk'tor ĕm-măn'ū-ĕl*, I. (Ital. *Vittore-Emanuele*), King of Sardinia: 1759, July 24—1824, Jan. 10 (reigned 1802-21); second son of Victor Amadeus III. Before his accession he bore the title Duke of Aosta. He was one of the most determined adversaries of the French Revolution; and on the outbreak of war 1792, he took the field in a vain contest. He opposed the peace with France 1796; and from this time absented himself from Turin till 1814. The treaty of Paris restored to him Piedmont, Nice, and half of Savoy, 1814; the treaty of 1815 added the remainder of Savoy, and the Congress of Vienna presented him with the duchy of Genoa—so that his little kingdom had profited territorially by its troubles. But the loyal delight of the Savoyards and Piedmontese at the return of their legitimate ruler was quenched by the early acts of his administration. The more liberal French institutions to which they had become accustomed were abolished, and the old absolutism was gradually restored. The restoration of old and hated abuses, and increasing taxation, excited discontent, which was heightened by the odious religious persecutions of the Vaudois and the Jews; secret societies were formed against the government; a revolution broke out 1821, Mar. 10. The army proclaimed the constitution promulgated by the Spanish Cortes 1812; and the king, rather than take the oath to it, resigned in favor of his brother, Charles Felix, Mar. 23.

VIC'TOR-EMMAN'UEL II., first King of a united Italy: 1820, Mar. 14—1878, Jan. 9 (king of Sardinia from 1849); (king of Italy 1861-78); b. Turin; son of Charles Albert (q.v.) of Sardinia. He was a pupil of the Jesuits, but showed little interest in study. In politics he took no concern, but early showed himself a soldier. Commanding the brigade of Savoy in the campaign of 1848-9, he evinced great gallantry at Goito and Novara. On the evening of the battle of Novara, his father, seeing the hopelessness of the struggle, and unwilling to bow to the onerous conditions offered by Radetsky, abdicated in favor of Victor, who, being husband of Archduchess Adelaide (cousin of the Austrian emperor), and uncommitted to the views of the Italian ultra-democrats, might hope to obtain more favorable terms from the victorious Radetsky. Victor thus ascended the throne of Sardinia—a kingdom nearly ruined—1849,

Mar. 23; and restrained for a time the enthusiasm of the more ardent among the national party, though, on the other hand, he maintained with utmost fidelity the provisions of the liberal constitution granted by his father—having succeeded in procuring the withdrawal of the Austrian claim for its abolishment. His noble maintenance of this constitution won him the confidence of the Italian people and ultimately won him the Italian throne. He curbed his passionate nature under misrepresentation and calumny; and steadily labored for an improved administration, rigid economy in the finances, care of the army, and encouragement to trade by commercial treaties with foreign nations. In securing as prime-minister 1852 Cavour (q.v.), Victor-Emmanuel called to his side one of the greatest statesmen of the 19th century. Cavour—whom the king nobly trusted—saw clearly that, despite the intense and almost unanimous desire for unity throughout Italy, a contest single-handed with Austria was hopeless, and preferred, till a more convenient season, to withhold all seeming approach to such an object. The property of the state was sold; and various measures were adopted calculated to greatly diminish the privileges, and restrict within moderate limits the inordinate influence of the clergy—changes which brought on the king the thunders of the Vatican; but Victor, nothing daunted, protested by a vigorous 'memorandum,' and more obstinately asserted and maintained his independence, as a secular monarch, of the papacy. The revolt at Genoa was sternly suppressed; yet the king and his ministers were not displeased to see the feeling of nationality still vigorous; for, following the traditional policy of the House of Savoy, he was only biding his time. With the view of improving his position in Europe, and gaining a place at its council-board, he sent an army of 17,000 men, under La Marmora, to take part with England and France in the Crimean war; and visited (1855) the courts of Paris and London, where he was received with enthusiasm. After the peace of Paris (1856), he made closer alliance with France, gave his elder daughter Clotilde in marriage (1859) to Prince Jerome Napoleon; and backed by the French under Napoleon III., entered into a war with Austria to rescue the Italian territories from the Austrian yoke (see AUSTRIA—*History*). The campaign was brief but decisive—the Austrians were routed in every battle—notably at Magenta 1859, June 4, and at Solferino June 24; and the Italians were hailing with exultation the near fulfilment of their long-cherished dream of unity, when the suddenly concluded peace between France and Austria at Villa-Franca dashed their hopes to the ground. The Milanese (minus the fortresses of Mantua and Peschiera) only was added to the Sardinian monarchy, and for this the king ceded Nice and Savoy (the cradle of his race) to France as the price of its alliance. But the people of

central Italy refused indignantly the offer of Prince Napoleon as their sovereign; and Tuscany, Modena, Parma, and the Romagna, renouncing their allegiance to their respective sovereigns, voted for annexation to Sardinia, and were formally adopted by Victor as his subjects. This was a greater advance toward the unification of Italy than the French emperor wished; accordingly, Victor, who was still dependent on his ally for safety, though secretly favorable to Garibaldi's expedition to Sicily, disavowed all knowledge of this project; and after the island was conquered without a blow being struck by a single Sardinian soldier, forbade the 'Italian Liberator' to pass over to the continent; yet he subsequently, with consent of Napoleon III., sent an army to aid Garibaldi in conquering Naples, and formally accepted the sovereignty of the two Sicilies. But in 1862, Garibaldi—thinking that the conquest of Rome in the same way would be equally acceptable to his sovereign—returned to Sicily, raised an army of volunteers, and was rapidly advancing on Rome, when Victor, forced by France, put an end to the expedition by capturing Garibaldi and his army at Aspromonte: see ITALY—*History*, GARIBALDI. Though proclaimed by the senate and house of deputies *King of Italy*, 1861, Feb., Victor prudently postponed all attempts to annex Rome and Venice; and directed his attention to the internal affairs of his kingdom, which had been distracted by the intrigues of the sovereigns whom he had supplanted. At length, in the quarrel between Prussia and Austria for supremacy in Germany, appeared his opportunity; and an offensive and defensive alliance with Prussia was followed by an Italian invasion of Venetia 1866, June. The Italians were defeated in the bloody battle of Custozza; but the disasters which befell Austria in her simultaneous contest with Prussia forced the Austrian empire ultimately to surrender Venetia: see GERMANY—*North German Confederation*. In 1870, Aug., after the outbreak of the war between France and Germany, the last detachment of the French garrison which had occupied Rome since 1849 was withdrawn; the imperial city, finally united to the kingdom, became the cap. of Italy and the seat of Victor's court.—The last years of Victor's life were uneventful. He died after a short illness, and was succeeded by his son Humbert.

VICTORIA: an 'original state' of Australia; smallest of the Australasian group, but the most important, taking precedence of all other British colonies and dependencies—India alone excepted.—Pop. (1901) 1,201,341.

Geographical Position and Extent.—Victor comprises the s.e. corner of Australia, at that part where its territory projects furthest into cool s. latitudes. Wilson's Promontory, to the s.e., the most southerly headland, just passes 39° s. lat.; while the most northern point, at the n.w. extreme, is in s. lat. 34°: long. 141°—150° e. of

Greenwich. To the w. is the state of S. Australia; to the n. is New South Wales, separated by the line of the Murray river eastward from 141° e. long. to its source, and thence by a straight line s.e. to Cape Howe; and from Cape Howe to S. Australia again, the state is bounded s. by Bass's strait; extreme length e. and w. about 480 m., extreme width n. and s. about 250 m. A remarkable indentation of both the n. and s. boundary opposite each other, about the middle of the state, reduces the breadth between the head of the Port Phillip inlet and the Murray to only 120 m. Area 56,245,760 acres, or 87,884 sq.m.—not quite twice the area of Pennsylvania. Coast-line about 800 m.

Physical Aspect.—Although Victoria may be called mountainous as compared with the general flatness of Australia, it has much of the quiet and peculiar Australian scenery. Vast naked plains are deviously traversed by broad and deep river-channels, though the rivers, except in winter and spring or after heavy rains, mostly are mere chains of pools, if not altogether dry. Overspread, in cool and moist seasons, with brilliant verdure, the drought and heat of summer quickly convert the grass into a natural hay, which, in the scarcity of sustenance from its ceasing to grow in that condition, is eaten off to the very roots by the sheep and cattle, leaving the surface bare and blackened. The 'open forest,' characteristic of Australian scenery, is largely prevalent. It distinguishes the gently undulating country of the better soils, whose surface is overspread by large trees, chiefly of the red gum (*eucalyptus*) and silver wattle (*acacia*); the trees being widely apart and of spare foliage, and the surface free from underwood, there is usually a good growth of grass, the whole presenting a park-like aspect, though with the usual lack of water. Mountain and forest prevail most in the e. division, where the Australian Alps of Gipps' Land, loftiest of Australian chains, present peaks ranging from 1,000 to 6,500 ft. above sea-level. The w. district is remarkable chiefly for numerous isolated hills of volcanic origin, some with craters still perfect, which probably have not, in a geological sense, been very long at rest. To this extensive volcanic system, Victoria owes the large proportion of its good arable land, as compared with the light sandstone and granite soils elsewhere in Australia. The chief rivers, besides the Murray and its branches (see AUSTRALIA), are the Snowy River, Tambo, Mitchell, Macallister, and La Trobe—all of Gipps' Land: also the Yarra-Yarra, and the Goulburn. The Australian fauna is very remarkable; notably the kangaroo or pouched family, and the emu or great wingless bird. There are besides the *echidna* and *platypus*, even more singular in structure, especially the last. The dingo, or native dog, is remarkable as a non-marsupial exception.

Climate.—This is on the whole healthful and agreeable, but subject to frequent and sudden change. The average

temperature of the year is 57°-59°, or about 9° above that of London. The common summer-heat is 65°-80°, with occasional advance to 90° and even to 100°-108° during hot winds and a dry season. The winter-range is mostly 45°-60°. Ice occurs in the midwinter of July, but rarely, except on elevated ground, survives the noonday sun. Every few years an unusually severe season covers the higher levels, and even the country generally, with snow. The cold of winter is keenly felt.

Civil and Political Divisions.—The state has had a comprehensive system of local government in force for many years which divides it into cities, towns, boroughs, and shires; the councilors are elected by the ratepayers, and the mayors of cities, towns, and boroughs, and presidents of shires by the councilors. The total area under local control being 87,302 sq.m., only 582 sq.m. remaining outside of local government.

History.—The first settlement was due to colonists from Launceston, Tasmania, who occupied the s.w. part at Portland Bay with flocks of sheep 1834. But the first important settlements were in 1835 at and near Melbourne, also by small parties from Launceston. The progress has been marvellous. When the gold mines were discovered, the settlement, after 16 years' existence, had a colonial population of 80,000, nearly one-third in the capital. Thenceforth for several years the imports, exports, and public revenue increased tenfold. In 1856 Melbourne (q.v.) had become a city of great wealth and commerce, pop. 100,000; while the pop. of the colony was 400,000. In 1901 the pop. of Melbourne (with suburbs practically one with the city proper) was 496,079. Some interior towns, besides, are rising to importance—Geelong (25,017), Bellarat (49,414), Sandhurst or Bendigo (41,898), the last two being the principal gold-field towns.

Victoria was separated from New South Wales 1851, and received its present name. Self-government was conceded to the colony, and was enthusiastically inaugurated 1854-56, with results in the highest degree beneficial. In less than 20 years thereafter this enterprising colony held an international exhibition on a large scale in its own capital (1880-1), visited by more than a million of people.

Population.—Pop. (1871) 731,528; (1881) 849,434; (1890) 1,133,000; (1901, March 31) 1,201,341. The people, in common with those of the other states of the group, are in the main British; about one-half were born in the state, and somewhat less than one-third in the Brit. Isles. The aborigines probably never numbered more than 15,000. The Germans are the only other foreign element of any noticeable strength: they began to arrive 1849. Assisted immigration, in vogue in the early days of the colony, has practically ceased; as the govt. of Victoria found it desirable to receive a more self-reliant and industrious class of workmen.

Religion.—Until 1875 a yearly donation of £50,000 for support of religion was distributed ratably among the sects—including the Jews. Some of the denominations, on principle, refused this governmental subsidy; and the growing disapproval led to the total abolition of the grant in aid 1875. The census of 1901 showed the membership of religious denominations as follows: Episcopalians, 432,732; R. Cath., 263,712. Presbyterians, 191,471.

Commerce.—The staple articles of export are wool and gold. The exportation of wool 1904 was valued at £3,376,013, of gold 732,602 ounces. The gold discoveries 1851 brought a sudden and extraordinary commercial development: for that year imports had been £1,056,437, exports £1,422,909; in 1854 the amounts were respectively £17,659,051 and £11,775,204. This rate of increase was, of course, not maintained. Imports (1880) £14,556,894; exports, £15,954,559; 1901 imports £18,927,340, exports £18,646,097. The import of articles, the product of Great Britain amounted (1901) to the value of £7,221,801; the export from Victoria to Great Britain £5,425,772. See *Gold mining,* below.

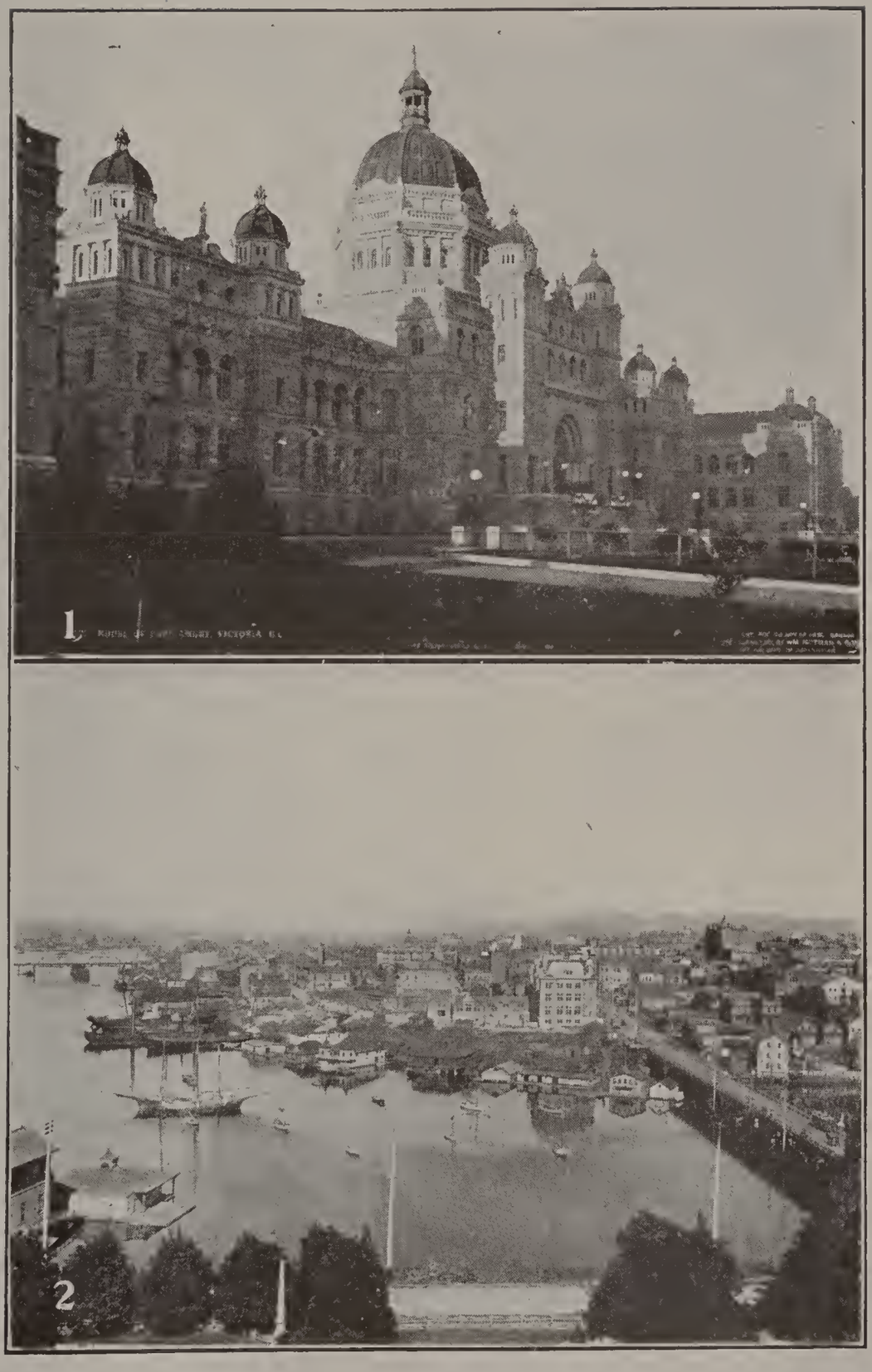
Squatting.—This colonial term has long since passed from its originally semi-savage and outcast associations to represent in Australia the condition of a sort of rural aristocracy. The squatter, using the country as he found it, placed on it his live-stock, which lived and throve on the natural herbage. This ready adaptation of the surface, with comparatively little of preliminary outlay, is the chief cause of Australia's rapid progress. At first the pastoral 'stations,' or 'runs,' were uninclosed areas, parcelled out to a small number with a bountiful hand, and at a nominal rent or occupation license-fee. Now these areas have been much subdivided, and in many cases fenced. In 1905 there were in the colony 372,397 horses, 1,694,976 head of cattle. The dairy and swine products for that year had a value of £2,912,000.

Agriculture.—Comparatively little was accomplished in this branch until 1860, when the government began to increase the facilities for acquiring and cultivating the public lands. In 1861 there were but 180,000 acres under the plow; (1904) 3,321,000 acres. The dry climate of south Australia seems highly favorable to the quality of wheat. The wheat was about 22,775,375 bush. Vine-culture rapidly extends, and wine-making is now general.

Manufactures.—The manufacturing industry of the state is extending, and the state is fully committed to the principle of a heavy protective tariff. In 1904 there were 4,208 various manufacturing establishments, employing 26,287 hands. A branch of the royal mint was opened 1872. Meat-preserving is carried on on a large scale; and there are very large paper-mills near Geelong. A little coal is produced in the state.

Gold-mining.—This may now be termed one of the

VICTORIA, B. C.



1. House of Parliament.
2. Victoria from Parliament Buildings.

skilled labors of the state; but it is no longer, on an average, among the most remunerative. Of the two great branches of mining—(1) the crushing of the auriferous rock for washing out the gold, (2) the washing from the *débris* or 'drifts' which nature has already pounded down —the latter, as a simpler process, was at first the most general; but lately the other has been increasingly followed. The gold product has gradually diminished. The total value of gold raised, from the disvovery of the gold-fields (1851) to 1905, was about £275,000,000. Usually the greater part of the gold is sent to Britain direct; though the proportion varies greatly, depending on the state of the exchange with India. The gold-fields of Victoria comprise 330 sq.m.

Railways.—The system is more extensive, and complete than in any other of the southern colonies. At the end of 1905 there were 3,394 m. of railway open for traffic, and more in construction.

Finances.—The public revenue is derived mainly from customs dues, excise, land sales and rents, and public works. The total revenue of Victoria in 1905, was £7,-509,657.

The outstanding public debt amounted 1880 to more than £20,000,000; about £16,000,000 of which was incurred for railways, all of which now belong to the state, traversing the state from Port Phillip to the river Murray. The remainder is the cost of water-supply to Melbourne and other parts of the state, and of aids to Melbourne and Geelong for town improvements. The debt (1905) was £51,892,962. The revenue is derived mainly from railways, customs and duties; there are moderate duties on sugar, tea and coffee, and various other articles. Municipal and road-district taxation are additional.

Political Institutions.—Victoria has almost entire autonomy. There is a parliament of two houses: the upper house (legislative council) consists of 45 members (unpaid); the lower house (assembly) 95 members, paid at the rate of £300 annually. A general election must be held every three years; and all voting is by secret ballot. The upper house is elected by voters of special qualification; the assembly by manhood suffrage. The governor represents the British sovereign, who appoints him; and he governs by ministries, who are of the crown's, that is, of the governor's, nomination, but who must possess the confidence of parliament. The term of the governorship is usually seven years; the present salary of the office is £5,000 a year. In salary, the Victorian appointment, though an important one of the colonial list, is exceeded by the gov.-generalship of Canada (which is £10,000) and the gov.-generalship of India.

Education.—A national system, to compete with the previously established denominational, had been early introduced into New South Wales and Victoria. National and denominational schools, each conducted by a separate

board of management, were alike aided by the state. The institution of a partially national system, and of a single board, was carried in the legislature 1862. That system was, in effect, that all state-assisted schools must be open to the children of all religious bodies, and that four hours daily of secular teaching be imparted to every pupil. This arrangement, on experiment, was unsuccessful. Schools still remained in connection with the several denominations; denominational school committees controlled the election of teachers, who were also permitted to impart religious instruction where desired. As a result, schools were unnecessarily multiplied in some localities, and the money of the state was wasted in their support. After various attempts to establish a system of state schools unconnected with any denomination, the government at last overcame all difficulties, and a bill passed both houses of the legislature which completely establishes a national, as opposed to a denominational system of education. The total number of public-schools in Victoria was (1900) 1,948, attendance 243,667; 884 private schools, with 51,834 scholars; besides 18 technical schools, various colleges, and the Melbourne University.

VICTORIA: seaport of Brazil, capital of the province of Espirito Santo, 270 m. n.e. of Rio de Janeiro; lat. 20° 18′ s., long. 40° 20′ w., at head of the Bay of Espirito Santo, whose entrance is defended by 5 forts. Victoria, founded 1535, was called Espirito Santo until 1558, when Victoria was adopted to commemorate the defeat of the allied Indians. Rice, sugar, and manioc are grown in the neighborhood.—Pop. 7,000.

VICTORIA, Canada: a city on Vancouver Island, capital of British Columbia, located on the Strait of Juan de Fuca, at the s.e. end of the island. It is an industrial centre, but in appearance is a beautiful residential city. It is noted for its healthfulness.

Railway and Steamship Connections.—The Canadian Pacific Navigation Company, the Victoria and Sydney railway, and the Esquimalt and Nannaimo railway (now owned by the C. P. railway) are important factors in the passenger and freight traffic of Victoria, while the Canadian Pacific steamers to China, Japan, and Australia make it a port of call. There is also connection with Vancouver, the Puget Sound ports, San Francisco, the Fraser river ports, and Alaska, and Mexico.

Industries.—Victoria has certain contributory interests, such as lumber, mining, salmon-canning, seal industry, and deep-sea fishing, which keep it to the front in a commercial sense. Its port is the first one reached by ocean vessels and the shipping business of the island naturally finds its centre there as well as a considerable and increasing ship-building interest. The starting of the Esquimalt dry-docks in 1880, and the maintenance of that suburb as one of the great British naval stations and as the fortified headquarters of the Pacific squadron until

lately, helped greatly in building up the prosperity and stability of the city.

Among the industries are breweries, boot, shoe and trunk making, soap factories, powder works, pickling and spice factories, chemical and metallurgical works, furniture and biscuit factories, flour, feed and rice mills, iron foundries and machine shops, etc.

Public Works, Banks, Revenues, etc.—The city has an electric street railway, lighting, gas and telephone systems, waterworks (established in 1873), and a new system of sewerage. The banking facilities are excellent and include branches of the Bank of Montreal, Canadian Bank of Commerce, Bank of British North America, Royal Bank of Canada, and Imperial Bank of Canada. The Northern, and the Merchants' Bank, with several loan companies. The inland revenue collections for the year ending 1906, June 30, were $187,431.

Public Buildings, etc.—The great event of later years in the city's annals was the construction of the splendid parliament buildings, which were opened with stately ceremony in 1898, Feb. 10. The cost was over $1,000,000. In it were established the Provincial museum and the Provincial library, the offices of the government departments and the handsome legislative chamber, panelled in Italian marble. Within the past few years a new government house has also been built as the residence of the lieutenant-governor. Of the other city buildings the Jubilee hospital, the City hall, the Custom house, and postoffice, the Drillshed, and Board of Trade building are the chief, with many churches and schools, orphanages, etc. There are also the Carnegie library, St. Joseph's hospital, the Courthouse, Orphanage, Empress hotel and the Isolation hospital.

History, Population, etc.—The early history of Vancouver Island is a record of the work and business of the Hudson's Bay Company. In 1843 Fort Victoria (or Camosun, as it was first called,) was erected as one of the many trading posts with which that great company had dotted the continent from Lake Superior to the shores of Alaska. In 1850 the first British governor of the island arrived and one year later Victoria was surveyed and the preliminary work upon the future city commenced. It was incorporated in 1862; was the home of the first legislature of the island in 1856; became capital of the newly-constituted Colony of British Columbia in 1868. From that time until the present the characteristics of Victoria have remained the same, although it has grown in population from 3,270 in 1871 to 5,295 in 1881, to 16,841 in 1891, and to 20,816 in 1901.

VICTORIA, or KWAN-TAI-LO: the capital of the British crown colony of Hong Kong (extends for upward of 4 m. along the s. shore of a beautiful harbor facing the peninsula of Kan-lung on the Chinese mainland. It is dominated by the Peak, a steep hill, on which are many

fine residences, and up which there are an inclined plane and steam-tramway. The chief buildings are the government house, city-hall, Roman Catholic and Anglican cathedrals, the large commercial houses and warehouses extending along the quays, public libraries, hospitals, and clubs. A public garden and a race course are maintained; the town is electrically lighted and has also gas works, and a good water supply. The population of Hong Kong in 1901 (283,905) was mostly massed in Victoria.

VICTORIA, Mexico: the capital of the state of Tamaulipas. See CIUDAD VICTORIA.

VICTORIA, Philippines: pueblo, province of Tárlac; near the outlet of Canarén lake; 10 m. n.e.e of Tárlac. It is at the intersection of three roads.—Pop. 10,362.

VICTORIA, South Africa: a town of s. Rhodesia, the centre of an auriferous district, 188 m. due s. of Salisbury. It has the usual government buildings and a hospital, and is protected by a fort. The climate is unhealthful during the rainy season. About 17 m. to the e. are the famous Zimbabwe ruins, the relics of a very ancient exploitation of the gold in the territory.—Pop. about 25,000 natives and 100 whites.

VICTORIA, Texas: city, county-seat of Victoria co.; on the Guadalupe river, and the Southern Pacific railroad; about 95 m. s.e.e of San Antonio and 30 m. from San Antonio bay, an arm of the Gulf of Mexico. The city is in a fertile agricultural region in which the chief products are cotton and sugar-cane. The chief manufactures are cotton and sugar-cane products, flour, and agricultural implements. There is an extensive trade in grain, fruit, sugar-cane, and cotton. The educational institutions are a public high school, founded in 1899. Nazareth Academy (R. C.), Saint John Baptist School (R. C.), for colored pupils, Saint Joseph's College (R. C.), and public and parish graded schools. There are three banks, one national and two private. The national bank has a capital of $150,000.—Pop. 4,250.

VICTO'RIA I., Queen of Great Britain, and Empress of India: b. 1819, May 24, at Kensington Palace; d. Osborne, Isle of Wight, 1901, Jan. 22; daughter and only child of Edward, Duke of Kent, 4th son of George III.: her reign began 1837. Her mother, Victoria Mary Louisa, was 4th daughter of Francis, Duke of Saxe-Coburg-Saalfeld, and sister of Leopold I. (q.v.), King of the Belgians. The first husband of Princess Victoria's mother, the Prince of Leiningen, died 1814; and 1818, July 11, she married the Duke of Kent at Kew. The duke died 1820, Jan. 23, leaving his widow in charge of an infant daughter only eight months old, baptized Alexandrina Victoria. The infant princess, as she grew up, was taught to seek health by exercise and temperance, to acquire fearlessness even from her amusements, such as riding and sailing, and to practice a wise economy united to a

discriminating charity. After a few years, the Duchess of Northumberland was associated with her mother in her nurture and education. The Princess Victoria became accomplished in music, drawing, and the continental languages; and acquired a knowledge of some of the sciences, particularly botany. Her father having been a whig, her political education was naturally derived from the members of that party; and Viscount Melbourne (q.v.) was her instructor in the principles of the British constitution. She ascended the throne of the United Kingdom on the death of her uncle, William IV. (q.v.), 1837, June 20—her uncle, the Duke of Cumberland, becoming king of Hanover, in virtue of the law which excludes women from the throne of that country. By this event, the connection which had lasted 123 years between the crowns of England and Hanover was terminated. Victoria was proclaimed 1837, June 21, and crowned at Westminster, 1838, June 28. She found on her accession Viscount Melbourne at the head of the govt., and during his premiership, and with the cordial assent of her subjects, the young queen was married at St. Jame's Palace, 1840, Feb. 10, to Prince Albert (q.v.), Prince of Saxe-Coburg and Gotha, second son of the duke then reigning. Her majesty had issue—four sons and five daughters: the Princess Royal, Victoria, b. 1840, Nov. 21, married, 1858, Jan. 25, to Frederick William, Crown Prince of Prussia, and Prince Imperial of Germany (see FREDERICK I. of Germany); Albert Edward, Prince of Wales, heir-apparent to the throne of the United Kingdom, b. 1841, Nov. 9, married, 1863, Mar. 10, Princess Alexandra, eldest daughter of Christian IX, King of Denmark; Princess Alice, b. 1843, Apr. 25, married, 1862, to Prince Frederick William of Hesse (she died 1878, Dec. 14); Prince Alfred, b. 1844, Aug. 6, created Duke of Edinburgh 1866, married, 1874, Jan. 23, Marie, only daughter of the Emperor of Russia; Helena, b. 1846, married, 1866, to Prince Christian of Denmark; Louisa, b. 1848, married, 1871, to the Marquis of Lorne (q.v.); Arthur, b. 1850, created Duke of Connaught 1874, married, 1879, Princess Louise Marguerite of Prussia; Leopold, b. 1853, created Duke of Albany 1881, married Princess Helena of Waldeck 1882 (he died 1884); Princess Beatrice, b. 1857, married, 1885, to Prince Henry of Battenberg.

For the changes of administration in this reign see GREAT BRITAIN; MELBOURNE; PEEL; RUSSELL; DERBY; ABERDEEN; PALMERSTON; GLADSTONE; DISRAELI; SALISBURY. The legislative measures of greatest importance were the establishment (1840) of the penny-postage (see POST-OFFICE); the amendment of the Poor Laws in Scotland (1845) and Ireland (1847); the abolition (1846) of the Corn Laws (q.v.), and (1849) of the Navigation Laws (q.v.); the Irish Encumbered Estates Act; the transfer (1858) of the Indian possessions from the E.

India Company to the crown (see INDIA); the admission (1858) of Jews into the house of commons; the Reform Act of 1867; disestablishment of the Irish Church (1869); the Irish Land Acts (1870 and 81); the abolition of purchase in the army (1871); the Education Acts (England 1870, Scotland 1872); the Representation of the People Act (1884); and the Redistribution of Seats Act (1885). See NATIONAL EDUCATION. Other memorable events in this period of British history were the discovery of the Northwest Passage by Sir Robert M'Clure (1850); the Exhibitions of 1851 and 62; the discovery of gold in Australia (q.v.) and in British Columbia; the war (1854-56) with Russia (q.v.) in defense of Turkey (q.v.), in which the siege of Sebastopol was a chief event; the Indian Mutiny 1857 (see INDIA); the Volunteer (q.v.) movement (1859); the establishment (1866) of telegraphic communication with America (see TELEGRAPH); the Abyssian war 1867 (see THEODORE); the formation of the Dominion of Canada 1867; the wars with Ashantees (1873), Zulus (1879), and Afghans (1878-80); the rising in the Transvaal; the agitations in connection with the Fenian Soc. (q.v.), Home Rule (q.v.), and the Land League; the passing of the Land Act (1881); and the war in Egypt (1882). In 1848 the only disturbance in Britain was a Chartist demonstration (see CHARTISM); while, during Victoria's reign, France (q.v.) was successively a constitutional monarchy, a republic, an empire, and again a republic; the great civil war in the United States of America (q.v.) resulted in the extinction of slavery; the formation of the kingdom of Italy (q.v.) was completed by the acquisition of Venetia and Rome; the unification of Germany, begun by the formation of the N. German Confederation, as the result of the war between Prussia and Austria (1866) was consummated by the events of the Franco-Prussian war (1870-1); the war (1877) between Russia and Turkey led to sweeping changes in the Balkan Peninsula (see TURKEY); and the Boer war, begun in 1899, and followed by the annexation of the South African Republic and Orange River Colony, altered the map of Africa.

In 1876 the title 'Empress of India' was added to the royal titles of the queen. The death of the prince-consort (1861) caused Queen Victoria to seclude herself for many years from public life. The queen published two vols.: *The Early Days of H. R. H. the Prince-Consort: Leaves from the Journal of Our Life in the Highlands* (1869); and *More Leaves from the Journal* (1884).

Victoria's golden jubilee was celebrated with much splendor (1887, June 20) at Westminster Abbey, and the queen laid the corner-stone of the Imperial Institute. The popular enthusiasm on this occasion plainly manifested the love of the people for their sovereign, and their undiminished attachment to the monarchy. The deaths in 1888 of Emperors William and Frederick, of Germany,

cast a gloom over the English court. In London the Metropolitan Board of Works was superseded by the London County Council. The death of John Bright (q.v.) in 1889 removed one of the greatest of England's orators. The collapse of the great house of Baring Brothers (1890) caused a crisis in commercial affairs; in the political world events concerning Charles Stewart Parnell led to the disruption of the Irish party. In 1891 Mashonaland was successfully colonized by the Brit. S. Afr. Co., and there was a commercial crisis in Australia. The year 1892 was saddened by the death of the Duke of Clarence, the eldest son of the Prince of Wales. A vote of 'no confidence' in the government led Lord Salisbury to resign and Mr. Gladstone again became premier; the deaths of Cardinal Manning, Charles H. Spurgeon, and Lord Tennyson caused much sorrow. In 1893 Gladstone introduced his second Irish home-rule bill, which passed the commons but was rejected by the lords. On May 10 the queen opened the Imperial Institute. In July the marriage of George, Duke of York, to Princess Victoria Mary of Teck was celebrated with great rejoicing. Mr. Gladstone resigned the premiership (1894) in favor of Lord Rosebery. The Manchester Ship-canal was opened formally by the queen, May 21. A son was born to the Duke of York, June 23, thus strengthening the direct line of succession. Disagreements in the liberal party (1895) resulted in the defeat of that party and the return of Lord Salisbury to power. Later, the Duke of Cambridge resigned the office of commander-in-chief. Lord Acton was appointed Regius Professor of Modern History at Cambridge, the first Rom. Cath. professor in that university since the time of James II. The territory of the Brit. East African Company became a British protectorate, and at the close of the year a pronouncement by Pres. Cleveland on the Venezuelan boundary dispute (q.v.) caused considerable feeling in England. In 1896 interest shifted to South Africa, where Dr. Jameson made an unsuccessful raid on the S. African Republic (q.v.). Prince Henry of Battenberg died this year. The visit of the Czar of Russia to the queen at Balmoral (1896) bore, it was suggested, on the outrages in Armenia. But the greatest event of Queen Victoria's reign was the celebration of her Diamond Jubilee (1897, June 21-26). This event was marked for its grandeur and for the spontaneous outpouring of the nation's heart. The welcome accorded the queen showed the intense pride of the people in their sovereign and manifested greater reverence, and affection than ever before. Representatives of every civilized nation were present, the United States being represented by the Hon. Whitelaw Reid, Gen. Nelson A. Miles, U.S.A., and Rear Admiral J. N. Miller, U.S.N. A naval review was held at Spithead (June 26), when England, without drawing a single vessel from her many foreign stations, placed 170 war-ships in line.

'In Queen Victoria,' according to Macaulay, 'her subjects have found a wiser, gentler, happier Elizabeth.' No former monarch has so thoroughly comprehended the great truth that the powers of the crown are held in trust for the people, and are the means, and not the end, of government. This enlightened policy has entitled her to the glorious distinction of having been the most constitutional monarch that any country has ever seen. Not less important and beneficial has been the example of her majesty and her late consort in the practice of every domestic virtue. Their stainless lives, their unobtrusive piety, and their careful education of the royal children, have borne rich fruit in the stability of the throne, and have obtained for the royal family of England the respect and admiration of the civilized world. See Theodore *Martin's Life of the Prince-Consort;* Sidney Lee's *Queen Victoria* (1902).

The progress made by the nation in the various elements of civilization, especially in material prosperity, during her reign was unparalleled (see GREAT BRITAIN); and perhaps during no reign was there greater political contentment.

VICTO'RIA: genus of plants, nat. order *Nymphæaceæ,* resembling the common walter-lily, but most nearly allied to the genus *Euryăle,* and distinguished from it particularly by the deciduous tips of the calyx, and the sterility of the innermost stamens. Only one species is known. *Victoria regia;* said to have been observed first by Hänke about 1801. It was described by Pöppig 1832, who observed it in the river Amazon; and it has since been found in many rivers of the n.e. of S. America. Its leaves are orbicular, float upon the water; and attain a diameter at 5-6 ft.; have the margin turned up, about two inches high; are of purplish color on the underside, and there exhibit a sort of wicker-work of very prominent veins, furnished with prickles. The flowers rise among the leaves upon prickley stalks: they are more than 12 in. in diameter, white, internally rose-colored, and very fragrant. The fruit is a capsule, almost globose, with a depression on the top, about half the size of a man's head, fleshy within, and divided into numerous cells, full of round farinaceous seeds, which are an agreeable food: the plant is therefore called *Maïs del Agua,* or 'Water Maize,' in parts of S. America. For cultivation of this plant, special hot-houses have been built in some places in Europe, and it has been introduced into India from seeds produced in England.

VICTORIA AND ALBERT, ROYAL ORDER OF: a British order instituted for women in 1862, enlarged in 1864, 1865, and 1880. There are about 70 women belonging to the four classes into which the order is divided.

VICTO'RIA BRIDGE: tubular bridge spanning the St. Lawrence at Montreal, on the Grand Trunk railway of Canada. This, the greatest tubular bridge in the

world, was begun 1854, May, and finished 1859, Dec. See TUBULAR BRIDGE: BRIDGE.

VICTORIA CROSS: a British military decoration instituted by Queen Victoria 1856, Jan. 29, at the close of the Crimean war. It is granted to soldiers and sailors of any rank for a single act of valor in presence of the enemy. It was instituted in imitation of the French cross of the Legion of Honor. It is a bronze Maltese cross, with a royal crown in the centre, surmounted by a lion, and the words 'For Valour' indented on a scroll below the crown. The ribbon is red for the army, and blue for the navy. A pension of $50 a year accompanies the decoration, when gained by anyone under the rank of commissioned officer, with an additional clasp and $25 if gained a second time.

At the end of 1905 the decoration had been awarded 522 times, the army receiving 477 and the navy 45; of the recipients 266 were non-commissioned officers and men and 256 commissioned officers (including three Indian Civil Servants). Of the 69 infantry regiments in the service 58 have won the decoration, and 19 of the 31 cavalry regiments; 41 crosses have been presented to the Royal Artillery and 27 to the Engineers; and one chaplain, the Rev. J. W. Adams, now dead, 32 Colonials, and men of the medical, hospital, and ordnance corps have also been decorated. Of those who have won the cross 201 are still living, among whom are Field Marshals Lord Roberts, Sir George White, and Sir Evelyn Wood, and Admirals Sir Nowell Salmon, Sir A. K. Wilson, and C. D. Lucas, the last named being the first to win the cross. The medal is now given to the nearest of kin to the soldier or sailor who dies from wounds received in the performance of a deed of conspicuous valor.

The American decoration corresponding to the Victoria Cross is the Medal of Honor, United States Military, established by act of congress, approved in 1862, July 12. While there have been numerous medals presented in commemoration of especially distinguished services, the Medal of Honor is the only established decoration presented for voluntary acts of valor. It has been awarded less than 300 times, among the winners being a paymaster who defended his charge against robbers and a negro cook who rescued a comrade under heavy fire.

VICTORIA FALLS: called by the natives Mosioa-Tunya ('smoke sounds there'), the greatest falls yet discovered; on the Zambesi river in Rhodesia, South Africa, about 100 m. below Kazungula and the confluence of the Kuando with the Zambesi. The falls extend, in four main cataracts, over a distance of more than a mile, the mass of water falling from a height of over 400 ft. The transverse chasm or rocky fissure, 400 ft. deep, into which the Zambesi plunges, extends straight across the course of the river, like a gigantic trough, a mile long and from 100 to 300 feet wide, the walls being composed of hard

basalt. From this fissure great columns of cloud-like spray rise to a distance of 1,000 to 3,000 feet, according to the time of year, and are visible on a clear day, 10 m. from the falls, whilst the thundering roar of the falls themselves can be heard at a distance of 20 or 30 miles. The spray clouds coupled with the noise gave rise to the native name of 'Mosi-oa-Tunya.' There is only one narrow outlet to the chasm, about 200 ft. wide, through which the mile-wide waters of the Zambesi have to force their way into what is called the 'boiling pot,' owing to its whirlpool turbulence. Thence the river continues a tortuous zigzag course for about 40 m. through a canyon averaging 600 ft. wide between basaltic cliffs 400 ft. high, before widening out again into a broad river which flows on, broken here and there by small rapids and cascades, until it pours itself into the sea some 1,000 m. away. The highest bridge in the world, with a span of 650 ft., crosses the gorge, a quarter of a mile below the Falls, from which, however, the falls are hardly visible, the bridge being almost at right angles to them. An hotel has been built for the immediate accommodation of visitors, and a township called Livingstone has been laid out on the north bank of the Zambesi about 4 m. off. Livingstone, the great African explorer, was the first European to see the falls, which he named after Queen Victoria.

Plans are in operation to utilize, as has been done at Niagara, the enormous water power which in the flood season is estimated at 35,000,000 horse power, but great care is being taken by the British South African Company to keep the beauty of this valuable asset of their territory free from the ravages of vandalism.

VICTO'RIA LAKE, or ALEXANDRINA, or KAYINGA LAKE: brackish lagoon in the s.e. of S. Australia; separated from the sea by a narrow strip of land. It receives the rivers Murray, Bremer, Angus, and Finnis; and communicates with the sea by a narrow passage into Encounter Bay. It is 30 m. long, and about 12 m. wide. The entrance to the lake is obstructed by a sand-bar.

VICTORIA LAND, Arctic Regions: the southernmost portion of an insular tract of Franklin Territory, Canada, constituting with Prince Albert Land and Wollaston Land, an island in the Arctic Ocean, with an area estimated at 80,000 sq.m. The island is separated from the mainland by Dease Strait, Dolphins Union, and Victoria Strait. Victoria Land was discovered and named by Sir George Simpson, and was explored by Dr. Rae in 1851.

VICTORIA LAND, or SOUTH VICTORIA LAND, Antarctic Regions: a vast continental plateau s.e. of New Zealand, extending from latitude 71° to the South Pole between longitudes 160° to 170° e. Victoria Land was discovered and named by the British navigator Sir James Clark Ross during his voyage of exploration 1841-2, when

he sailed along a rocky ice-bound coast for 450 m., finding in lat. 78° 10′ s. a lofty active volcano 12,367 ft. high and an inactive cone over 11,000 ft. high, which he named respectively Erebus and Terror, after his vessels. The loftiest point of land is Mount Melbourne, which attains a height of over 14,000 ft. Since the expedition of the Belfica (1897-9), and of the British expedition (1898-1900) under the command of the Norwegian, Borchgrevink, Swedish, German, and British expeditions have added considerably to the knowledge concerning the meteorological and other conditions of the region. The British Antarctic expedition, which sailed on the specially built and equipped steamship Discovery from London, 1901, July 31, returned to Lyttleton, New Zealand, 1904, April 1, in company with the relief steamers Morning and Terranova. The Discovery had been frozen in for 13 months at the foot of Mount Erebus. Scientific work had been maintained throughout the whole period. At Cape Adare Borchgrevink's huts were found in good preservation; a new route to the west was discovered; and a depot was established 2,000 ft. up the glacier. In a dash to the South Pole, Capt. Scott, Dr. Wilson, and Lieut. Shackleton reached lat. 82° 17′ s., further progress being impeded by the softening of the snow and the death of their dogs. The fact was established that the interior of Victoria Land continued at a height of 9,000 ft., and is evidently a vast ice-covered continental plateau.

In 1909 Shackelton returned from another expedition and reported getting within 97 m. of the pole. Nothing of value resulted, except the knowledge that Siberian ponies could endure the extreme temperatures of the polar regions.

VICTO′RIA NYAN′ZA: immense fresh-water lake in central Africa, the main reservoir of the Upper Nile. Crossed near its n. end by the equator, and bisected by the meridian 33° e., it measures about 230 m. n. to s., and somewhat less e. to w.; about 27,000 sq.m. (nearly as large as the state of Maine). This area includes numerous islands; the larger ones, e.g., Ukerewe, Sesse, Usurguru, having considerable population. The surface of the lake is more than 4,000 ft. above sea-level, 1,400 ft. higher than Tanganyika, and though the Victoria Nyanza is not so deep as Tanganyika, it is in places 500 to 600 ft. in depth. The water is good and fresh, in some places of a dirty white color. The shores are generally low and fertile, ascending toward hills at no great distance. At the s. end of the lake, the Shimiyu, the southernmost head-stream of the Nile, enters; and the chief affluent of the Victoria Nyanza is the Kagera or Kitangule, from the w. Stanley 1889 discovered a great southward extension of the Victoria Nyanza—a large bay behind a line of mountain-islands at the s. w.—carrying the southern limit of the lake to 2° 48′ s., only 155 m.

from Lake Tanganyika.—The Nile, here called Victoria Nile or Somerset river, leaves the lake at its n. extremity by the Ripon Falls, 12 ft. high and 400 or 500 ft. wide. The lake was discovered 1858 by Capt. Speke, and explored by him and Grant, Baker, Stanley, and the missionaries established in Uganda, Mtesa's kingdom, on the n.w. shore of the lake. Other names for the lake, Nyanza meaning water or lake merely, are Nyanza Ukerewe and Luta Nzige, a name applied also to the *Albert Nyanza,* another lake w. of the Victoria Nyanza.

VICTORIA UNIVERSITY. See OWENS COLLEGE.

VICTORIA UNIVERSITY: formerly situated at Cobourg, Ontario, Canada, now at Toronto, and since 1890 in federation with the University of Toronto. It was founded by resolution of the Conference of the Methodist Church in Canada, held at Kingston, in 1830, and was incorporated by Royal Charter, in 1836, under the name of 'Upper Canada Academy.' This Royal Charter was the first ever granted by the English government to a non-conformist body for an educational institution. In 1841, the charter was extended by the Parliament of Canada, the name was changed to Victoria College, and power was given 'to confer degrees of Bachelor, Master, and Doctor of the various Arts and Faculties.' In 1841, Oct. 21, the first session of the college under the enlarged charter was opened, with the Rev. Egerton Ryerson as principal, and with a full Arts curriculum. In 1854-5, the Faculty of Medicine was added and established in Toronto. In 1860, the Faculty of Law and, in 1871, the Faculty of Theology were added. In 1883-4, Albert College, Belleville, was united with Victoria College, and the name was changed to Victoria University. The Ontario Ladies' College, Whitby, Alma College, St. Thomas, and Columbian Methodist College, New Westminster, B. C., have since that time been affiliated. In 1890, Nov. 12, by proclamation of the Lieutenant-Governor, Victoria University was federated with the University of Toronto. (See TORONTO, UNIVERSITY OF.) New buildings were erected in Queen's Park, Toronto, and the federation was consummated in 1892. The Faculty of Arts then assumed the work and relation of a college in the University of Toronto, teaching such subjects as were assigned by the Act of Federation to the colleges. For all other subjects the students have access to the lectures and laboratory practice of the University of Toronto under the regulations of which all degrees, except those in Divinity, are conferred. In addition to the work in Arts above mentioned provision is made for courses in theology, both elementary and advanced. The staff consists of 17 professors and lecturers, and the number of students is 380.

VICTUAL, n. *vĭt'l,* now generally in plu.. VICTUALS, *vĭt'lz* [F. *victuaille,* provision—from mid. L. *victuālĭa,* victuals—from L. *victus,* mode of living, provisions;

vivĕrĕ, to live]: provision for food; articles commonly used as food: V. to supply with provisions or articles of food; to store with provisions, as a ship. VICTUALLING, imp. *vĭt'l-ĭng.* VICTUALLED, n. *vĭt'ld.* VICTUALAGE, n. *vĭt'l-āj,* victuals. VICTUALLER, n. *vĭt'l-er,* one who keeps a victual-house; an innkeeper or tavern keeper; a seller of intoxicating liquors by retail, usually called a *licensed victualler;* one who sells grain; in the *British navy,* a provision-ship. VICTUALLING-YARD, a yard either contiguous to or forming part of a dock- or navy-yard, where vessels of the navy are 'victualled' or provisioned.

VICU'NA: a species of wild llama (*Lama vicunna*) which lives in the most inaccessible and precipitous portions of the Andes near the snow-line from Peru to Bolivia, and is generally seen in small herds. It is described as being very wild and vigilant and is much hunted for the wool and hide. The domesticated alpaca (q.v.) is by some naturalists considered to be an offshoot of the vicuña, though there is much reason to doubt this. See LLAMA.

VICUNA, MANUEL: Chilean Roman Catholic prelate: b. Santiago, Chile, 1778; d. Valparaiso, Chile, 1843. He was graduated in theology from the College of San Carlos, was ordained to the priesthood, and engaged in traveling missionary work. He inherited a large fortune which he used in his charitable work, employing a considerable share of it in building a house of retirement. In 1830 he was made a bishop and in that capacity labored earnestly for the re-establishment of the theological seminary. In 1840, when Santiago was made a metropolitan see, he became the first archbishop. He subsequently served as a member of congress of the council of state.

VICUNA, PEDRO FELIX: Chilean journalist: b. Santiago, Chile, 1806; d. there 1874. He was well educated, and entered journalism at an early age, becoming at 21 one of the founders and editor-in-chief of the Valparaiso *El Mercurio.* He was subsequently connected editorially with *El Telégrafo* (1827); *El Elector* (1841); *El Republicano* (1845); *La Reforma* (1847); and other leading periodicals, and in 1865 was elected to the national senate, where he introduced the law abolishing imprisonment for debt. He wrote: *Unico asilo de las Repúblicas Hispano-Americanas* (1837); *Porvenir del Hombre* (1858); and *La Hacienda Pública* (1864).

VICUNA-MACKENNA, BENJAMIN: Chilean historian: b. Santiago, Chile, 1831, Aug. 25; d. Santa Rosa del Colmo, Chile, 1886, Jan. 25. He was educated at the University of Chile, and early engaged in researches in national history. For his activity in the revolution of 1851-2 he was imprisoned and condemned to death, but escaped to this country, and then went to Europe. In 1856 he returned, and was admitted to the bar, but

political disturbances caused his exile in 1859-63. Upon his return in the last named year he became editor of the Valparaiso *Mercurio*, in 1864 was elected a deputy, and in 1865-6 was special envoy to Peru and to the United States. He was senator in 1871-6, and in 1875 he was a candidate for the presidency. As *intendente* of Santiago in 1872-4 he greatly improved the appearance of the city, and at his own expense laid out the beautiful pleasure grounds of Santa Lucia. His work as a historian is widely circulated; it is regarded as accurate, and is well written. It includes: *El Sitio de Chilean en 1813* (1849); *Revolución del Perú* (1861); *Historia de la Administración de Montt* (5 vols., 1862-3); *Historia de Valparaiso* (2 vols., 1868); *Historia de las Campañas de Arica y Tacna* (1881); *Al Galope* (1885); etc.

VIDA, *vē'dâ*, Marco Girolamo: Latin poet: about 1485-1566, Sep. 27; b. Cremona. He studied theology in Padua and Bologna, and became canon of St. John Latteran, Rome. He was promoted to the episcopal see of Alba 1532. Vida wrote the *Christias* (6 books) and other epics; also several didactic poems, among them *De Arte Poetica*. His poem *Scacchiæ Ludus* (the game of chess) was translated into English by Oliver Goldsmith.

VIDAURRI, Santiago: Mexican soldier: b. Nuevo Leon, Mexico, about 1803; d. City of Mexico 1867. He came of a wealthy family of Indian extraction, was well educated, admitted to the bar in 1826, and entered political life. He was engaged in several civil wars, rose to the rank of colonel, and in 1852 was elected governor of Nuevo Leon. He assisted in the overthrow of Santa Anna in 1854-5, though refusing to act in conjunction with Alvarez, and was an unsuccessful candidate against the latter for the presidency in 1855. He assumed a species of dictatorship over the states of northern Mexico, forcibly annexed Coahuila, and was long suspected of a design to establish a separate republic. He withheld recognition of Comonfort as successor of Alvarez until 1856, but was then forced to grant it in order to retain his control of the states Nuevo Leon and Coahuila. He at first participated in resistance to the French intervention in 1862-4; later became an officer in the cabinet of Maximilian. He resigned in 1867, but after the fall of the City of Mexico he was captured and shot as a traitor.

VIDE, v. *vī'dē* [L. impera. of *vidĕō*. I see] see; look at; indicating reference to some other place or thing; as *vide, supra*, 'see above'; *vide ante*, 'see before'; *quod vide* usually abbreviated (*q.v.*), 'which see,' etc. Videlicet, ad. *vī-del'ĭ-sĕt* [L.—from *vidērĕ*, to see; *licet*, it is allowed]: to wit; namely; that is to say; the contracted form, Viz., is in much more common use. Vidimus, n. *vī'dĭ-mŭs* [L. we have seen—from *vidĕō*, I see]: a view or inspection; an abstract or summary of documents, accounts, and the like.

VIDETTE, n. *vĭ-dĕt*: also spelled VEDETTE (q.v.).

VIDIMUS: see under VIDE

VIDOCQ, EUGÈNE FRANÇOIS: French adventurer and detective: b. Arras, France, 1775, July 23; d. 1857, May 10. He was apprenticed to his father, a baker, at 13, and after constant pilfering robbed the shop of 2,000 francs and fled to Ostend. He soon lost his money and after living a life of vagabondage entered the French army, from which he deserted to the Austrians, but later returned to the French army. His career as a soldier was one of miserable intrigue and disgraceful adventure and he was finally implicated in a forgery for which he was sentenced to eight years imprisonment. He escaped and after further discreditable escapades settled in Paris, where he gained employment on the secret police force. His wide knowledge of the criminal classes enabled him to render efficient service, and in 1812 he was made chief of the *brigade de sureté*. His activity in the service cleared Paris of great numbers of the criminals with which it was infested, but in 1827 he was removed from office. His subsequent career was one of obscurity and failure, though he apparently endeavored to live an honest life, and he died in wretched poverty. His *Mémoires* (1828) are not regarded as authentic.

VIDUAGE, n. *vĭd'ū-āj* [L. *vĭdŭus*, widowed]: the state of being a widow. VIDUITY, n. *vĭ-dū'ĭ-tĭ* [L. *vidŭĭtas*]: in *OE.*, widowhood.

VIE, v. *vī* [a metaphor taken from the language of gamesters, with whom It. *invitare*, F. *envier*, was to invite to throw for certain stakes: It. *invito*, an inviting, a vie or saying at play: OE. *a-vie*, as if for a wager; thus *vie* is merely a doublet of *invite*, which see]: to strive for superiority; to use effort in a contest or competition, followed by *with;* in *OE.*, to urge; to practice in rivalry; to hazard; to wager; N. in *OE.*, contest; competition; wager. VYING, imp. *vī'ĭng*. VIED, pp.

VIELE, *vē'lā* EGBERT LUDOVICKUS: civil engineer and soldier: b. Waterford, N. Y., 1825, June 17; d. 1902, April 22. He was educated at West Point; and being assigned to the 2nd U. S. infantry, served with that command in the Mexican war. He resigned his commission as first lieutenant 1850, and settled as civil engineer in New York; he was state engineer of N. J. 1854-56; was the chief engineer of the New York Central Park 1856-60. Then he was chief engineer of the Prospect Park, Brooklyn, N. Y., till the outbreak of the civil war, when he entered the volunteer service. He served first in the defenses of Washington as captain of engineers in the 7th N. Y. regiment. He was commissioned brigadier general of volunteers 1861, Aug. 17, and established a camp of instruction in Westchester co., N. Y. He commanded the force that captured Ft. Pulaski, at Savannah, 1862, then took Norfolk, Va., and was military governor

of Norfolk 1862, May—1863, Oct.; he then returned to civil life in New York. He was representative in congress 1884-86. He published numerous papers on engineering, sanitary science, etc.

VIELE, HERMAN KNICKERBOCKER: American novelist, son of E. L. Viele: b. New York 1856, Jan. 31; d. 1908, Dec. 14. He studied engineering with his father and practiced as a civil engineer for some time in Washington, D. C. He published *The Inn of the Silver Moon* (1900); *The Last of the Knickerbockers* (1901); *Myra of the Pines* (1902).

VIENNA, *vē-ĕn'a* (Ger. *Wien*, L. *Vindobona*, afterward *Faviana*): city, cap. of the Austrian empire; on the right bank of the Danube; lat. 48° 13′ n., long. 16° 23′ e.; on a plain at the foot of the outlying spurs of the *Wiener Wald*, the e. extremity of the Alps, but at a height of 550 ft. above sea-level. Eastward a vast plain extends as far as the Carpathians, which are visible on a clear day. On the n. the hills approach within about 6 m., and extend uninterruptedly to the Tyrolese Alps in the w. An arm of the Danube (called a canal) passes along the n. e. side of the city, and separates it from the suburb of Leopoldstadt. Into this arm flows the foul and (when not swollen by rains) insignificant stream called the Wien, from which the city takes its name. Vienna consists of the old city or inner town, called the *Stadt*, with narrow and irregular streets; and of a circle of nine suburbs, completely surrounding it. Around the *Stadt*, and separating it from the suburbs, is a space on which were formerly the fortifications (levelled 1858). This space has been largely covered with buildings, of which the principal form part of the Ringstrasse, a handsome boulevard, in many places more than 200 ft. wide. Besides the old fortifications above mentioned, there is an external ring with rampart and fosse, still preserved as the boundary of the city imposts: these fortifications are called the *Lines*, and formerly encircled both suburbs and city; the suburbs are now, however, rapidly extending outside. Unlike most other European cities, the old part of the city is the most fashionable. In the *Stadt* are the palaces of the emperor and of some of the principal nobility, many stately mansions, the public offices, the finest churches, most of the museums and public collections, the colleges, the exchange, and the best shops. Since the erection of the Ringstrasse the other buildings on the site of the old glacis, many of the aristocracy have removed thither. The suburbs are laid out in wide streets, many of which, being unpaved, are very dusty in summer and very muddy in winter. As a rule, the houses are let in 'flats,' almost the only exception being the palaces of the higher nobility; and in some cases even these consist of only the two lower stories of the building. Among principal squares are the *Josephsplatz* and the *Burghof* (the latter the court of the palace); the outer

Vellington. Noailles. Dupin. Dalberg. Rasoumoffsky. Ciancarty. Genlz. Cathcart.
Lobo. Stewart. Wacken. Humboldt.
Saldanha. Metternich. Nesselrode. Wessenberg. Labrador. Talleyrand
Lowenhielm. Palmella. Castelreagh. Stackelberg.
Hardenberg.

CONGRESS OF VIENNA.

burgplatz, laid out with grass and flowers, and in which stands the *Burgthor;* the *Neuer Markt, am Hof*, and *Freiung*. The three last mentioned are in the heart of the city, contain many picturesque buildings, and are otherwise interesting.

Vienna is the see of an archbishop; and the chief of its many churches is the Cathedral of St. Stephens, 354 ft. long, 229 ft. wide, 80 ft. high, with a very beautiful tower, 450 ft. high, erected 1860-64 to replace the former structure, which was removed as being unsafe. The choir was begun 1359; the nave dates a century later. The church of the Augustines is remarkable for its monument of Archduchess Christina of Saxe-Teschen, one of the most successful works of Canova. The most beautiful church in Vienna, and one of the most beautiful in all Germany, is the *Votiv-Kirche*, built in commemoration of the emperor's escape from assassination 1853: it is a Gothic church, finished 1878, with two towers and spires, and covered with delicate and beautiful tracery and carving. The Imperial Royal Palace is an ancient building, whose various portions were erected at different times. Adjoining the Palace, or forming part of it, are the Imperial Library (410,000 vols.—12,000 printed before 1500—and 20,000 MSS.), the Treasury, the Cabinet of Coins and Antiquities, etc. Among interesting collections are the Belvedere, including the Ambras collection (pictures, sculptures, and antiquities); the Arsenal; the Liechtenstein Gallery, and Count Harrach's collection (pictures), and the Albertina (drawings and engravings), the latter containing the original study of Raphael's *Transfiguration*. The Polytechnic Institution (for instruction in practical science, etc.) is attended by about 1,000 pupils, and in connection with it there is a technological museum. The University (founded 1365) has about 6,000 students on its roll, a staff of more than 400 professors and lecturers, and a library of 225,000 vols. As a school of medicine it is celebrated all over Christendom. The principal places of public resort for the people are the gardens of the palace at Schönbrunn, the *Augarten*, and the *Prater*, the latter containing about 2,000 acres, probably the largest park in Europe: the buildings of the great exhibition of 1873 were in it. The Vienna Observatory was equipped 1881 with the largest telescope which had then been made. Vienna contains eight or nine theatres, of which the best are in the *Stadt*. At the burning of the Ring Theatre (1881) 570 lives were lost. Very extensive works were begun 1869 to bring the Danube closer to the city, and improve its navigation. These were completed 1880 at a cost of more than $10,000,000, and have tended to make Vienna the centre of the ship-trade between east and west.

Vienna is the first manufacturing town in the empire. Its manufactures include cotton and silk goods, leather, porcelain, arms, musical instruments, hardware, and numerous other articles. There is also a large inland trade.

It is the centre of a great railway system. The diversion and deepening of the channel of the Danube, which brings the river nearer the city, has largely increased its shipping trade between eastern and western Europe. In 1890 many suburbs were incorporated with the city, which is now divided into 19 districts.

Vienna appears to have been a Ruman station in the 1st century. It was afterward included in Upper Pannonia, and received the name of Vindobona. It was taken and pillaged by Attila about 450. It was conquered by Charlemagne about 791, became the capital of the Margraviate of Austria about 1142, a free imperial city in 1237; it was besieged by Solyman in 1529, by Kara Mustapha in 1683, and was occupied by Napoleon 1805, Nov. 13, and 1809, May 12. Pop. (1890) 1,364,548; (1900) 1,662,269.

VIENNA, Concordat of: also known as the Concordat of Aschaffenburg, between Pope Nicholas V. and the imperial estates of Germany, in 1448, Feb., by which that eminent pontiff agreed to certain changes in the relations between the papacy and the empire in the spirit of the Concordat of Constance, made in 1418 by Pope Martin V. with the representatives of Germany, France, England, and other countries.

VIENNA, Congress of: a congress of powers assembled after the first overthrow of Napoleon to reorganize the political system of Europe, disturbed by the conquests of France. The Congress assembled in 1814, Nov. 1. The principal powers represented in it were Austria, Russia, Prussia, England and France. Spain, Portugal, Sweden, and other minor powers were also consulted on matters more nearly concerning them. The emperors of Austria and Russia, the king of Prussia, and many other German princes were present in person. The leading territorial adjustments effected by the Congress were the following: Austria recovered Lombardy and Venetia, while Tuscany and Modena were conferred on collateral branches of the imperial house. The Infanta Maria Louisa, queen of Etruria, received the duchy of Lucca in exchange for Parma, Piacenza, and Guastalla, which were given with the title of empress to Maria Louisa, ex-empress of France. The Legations, Benevento, and Ponte Corvo were restored to the pope. The king of Sardinia recovered Piedmont and Savoy, with the addition of Genoa. Murat retained Naples. Holland and Belgium were erected into a kingdom for the Prince of Orange, William I. Hanover, with the title of king, returned to the king of England, and the Ionian Isles were as a republic placed under the protectorate of Great Britain, which also retained Malta, Helgoland, and several conquered colonies. A federative constitution, with a diet at Frankfort, was established for Germany. The kings of Denmark and the Netherlands were admitted in virtue of their German possessions to the diet. Bavaria was

THE NEW OPERA HOUSE, VIENNA, AUSTRIA.

reinstated in her Palatine possessions with Würzburg, Aschaffenburg, and Rhenish Bavaria, in return for her restorations to Austria. The demands of Prussia caused a dispute which nearly broke up the congress, but she was finally satisfied with the duchy of Posen, the Rhine Province, and a part of Saxony. The congress was suddenly broken up by the restoration of Napoleon; but its acts were signed by the powers interested in 1815, June 9.

The Congress of Vienna showed a disposition also to interfere in American affairs, and an attempt was made to introduce monarchy in the South American countries then engaged in liberating themselves from the Spanish yoke, by the establishment of a French province as sovereign over the Argentine provinces. The people of Argentina rejected the proposition. These and other meditated European aggressions, encouraged by the hostile attitude toward republican institutions of most of the powers represented at Vienna, led to the declaration of principle known as the Monroe Doctrine, which for a time put a quietus on monarchical plots against American republics.

VIEN'NA, TREATIES, ETC., OF: various compacts arranged by representatives of European nations, at this capital, selected for its central position, and for the prominent part which Austria has always taken in the wars of modern Europe. The *first* treaty of Vienna (1725, Apr. 30) was a mutual guarantee of dominions by Emperor Charles VI. and Philip V. of Spain; besides which, the former agreed to aid in the recovery of Gibraltar from Britain, and to aid the Pretender in supplanting George I. of England, in consideration of Philip guaranteering the Pragmatic Sanction. The *second* treaty (1731, Mar. 16) was a joint guarantee of the Pragmatic Sanction by George II. of Britain and the states of Holland. The *third* (1738, Nov. 18) was a similar guarantee by Louis XV. of France. In consideration of the revision of Lorraine and Bar (to be given meantime to Stanislas, ex-King of Poland), as well as a settlement of the Polish succession dispute, and a rearrangement of the possessions of Austria, Spain, and Sardinia, in Italy. The *fourth treaty* (1809, Oct. 14) was between France and Austria, after the battle of Wagram and the armistice of Znaim, by which Austria agreed to resign some districts on the w. border of the archduchy to Bavaria; Goritz, Friuli, Trieste, Carniola, and parts of Croatia, Carinthia, and Dalmatia, to France, these provinces to be formed into the govt.-gen. of Illyria; some districts of Upper Lusatia to the king of Saxony; w. Galicia, with Cracow and Zamocz, and a share in the salt mines of Wielicza, to the grand-duchy of Warsaw; and the e. corner of Galicia to Russia: a total loss to Austria of 58,170 sq.m., with pop. 3,500,000, and all her seaports.

The next and far the most important meeting of the

representatives of European nations was the *Congress of Vienna*, after the first treaty of Paris, for the general settlement of the affairs of Europe. The congress, assembling 1814, Sept. 30, was composed of Czar Alexander I. of Russia, with Count Nesselrode; the king of Prussia, with Hardenberg; Lord Castlereagh, and afterward the Duke of Wellington, representatives of Britain; Prince Metternich for Austria; Count Talleyrand for France; as well as representatives of Spain, Portugal, Sweden, Rome, Germany, and all the other minor powers who were interested personally in the deliberations—the total number convened being about 500. But the representatives of the minor states, who had expected a species of European parliament, to which all would be admitted, were sadly disappointed by the preliminary resolution of the great powers to constitute two committees, one of which would deliberate on the affairs of Germany; and the other, composed of the representatives only of Austria, Prussia, Russia, and Britain, would discuss the affairs of Europe generally, and decide respecting partition of the conquered districts (formerly belonging to France and her allies), and the frontier of each European sovereignty. To this latter council, Talleyrand, by the influence of Castlereagh, who early saw the necessity of a counterpoise, to the influence of Russia and her follower, Prussia, in the conferences, was admitted (Oct. 5); and three days afterward it was increased by the representatives of Spain, Sweden, and Portugal. The first resolution of the European committee, to rearrange Europe so as to leave the parties directly interested nothing more to do than give their adhesion to the arrangements made for them—an arrogation of sovereignty over all Europe—was loudly exclaimed against; but the congress was one of rulers and *their* representatives, and not of the nations and *their* representatives; so the indignant clamor on all sides was unheeded. The points at once and unanimously settled were: the constitution of Belgium and Holland into one kingdom (*the kingdom of the Netherlands*); the annexation of Norway to Sweden; the restoration of Hanover, with a large slice of Westphalia, to the king of Great Britain; of Lombardy to Austria; and of Savoy to Piedmont. But the questions as to the disposal of Poland, Saxony, and Genoa were not so easily settled. Russia and Prussia, vain of their prominent share in crushing Napoleon, were bent on extravagant aggrandizement—Russia insisting on obtaining the whole of the grand duchy of Warsaw (see POLAND), while nothing less than the whole of Saxony, and some of the trans-Rhenish provinces of Westphalia, would satisfy Prussia; and both significantly hinted at the proximity of their colossal armies, with the view of awing the other powers into compliance. But Castlereagh was not amenable to such influences; and while steadily refusing to yield an iota to such preposterous pretensions, he joined with

Metternich and Talleyrand in a secret treaty, offensive and defensive, 1815, Feb. 3, which was cordially acceded to by Hanover, Sardinia, Holland, and Bavaria. The news of this agreement soon leaked out, and produced considerable modification in the pretensions of the northern powers. At last it was agreed that Prussia should obtain a portion of Saxony (now Prussian Saxony), Posen, Cleves, Berg, the greater part of the left bank of the Rhine as far as the Saar, and Swedish Pomerania; and cede East Friesland, Hildesheim, etc., to Hanover; Anspach and Baireuth to Bavaria; and Lauenburg to Denmark: while Poland, except Posen, Thorn, and those parts of the grand duchy which had been (1809) taken from Austria, was to be erected into a kingdom separate from Russia, but under the rule of the czar. Austria recovered the cessions which she had been forced to make 1809, obtained also the Valteltine from Switzerland, and the establishment of collateral Hapsburg lines in Tuscany and Piombino; while Maria-Louisa obtained Parma. The pope was replaced in his former position as a temporal sovereign; the ancient constitution of Switzerland re-established; and Genoa—despite the strongly expressed aversion of its inhabitants—incorporated with Sardinia. The news of Napoleon's return from Elba somewhat hurried the conclusion of these multifarious arrangements, yet the negotiations were not interrupted; Metternich's scheme for a new confederation of the German states (the same which continued till 1866) was unanimously agreed to—the question of mutual indemnities, rectifications of frontier, etc., being subsequently settled (1819, July 20) at Frankfurt, by a territorial commission of representatives of the four great powers. The questions of the slave-trade and of the free navigation of the Rhine and its tributaries were brought up by England, and also satisfactorily settled. Finally a formal treaty (the *fifth treaty of Vienna*) was drawn up and signed, 1815, June 9.

VIEN'NA PASTE: preparation extensively used as an encaustic, though not contained in the Pharmacopœia: it consists of a mixture of equal weights of caustic potash and freshly burned lime rubbed to powder in a warm mortar. To 50 parts of this compound 60 parts of quicklime are added, and the whole kept in a well-stoppered bottle. When required for use, the powder is made into a soft paste with a little spirit, and applied to the part to be cauterized. Vienna paste is much employed by some physicians in certain affections of the womb; and is one of the best applications to an indurated chancre. See SYPHILIS.

VIENNE, *vē-ĕnn′:* department of w. France; bounded n. by the depts. Maine-et-Loire and Indre-et-Loire, w. by Deux-Sèvres, which intervenes between this and the maritime dept. of Vendée; 2,680 sq.m. The Vienne, affluent

of the Loire, is the principal river, all the other streams of the dept. being tributary to it: it flows from s. to n., and receives the Clain, Gartempe, and Creuse—of which only the last is navigable. The surface of Vienne is flat, with a gradual slope toward the n. The country consists of fertile plains, fine pasture-lands, and extensive forests. The climate is soft, temperate, and healthful. Grain is cultivated in greater quantity than is required for local consumption. On an average, more than 21,000,000 gallons of wine are produced annually. In general, however, agriculture is in a backward state. The mineral riches consist principally of iron and manganese, and numerous quarries of building and other stones, including lithographic stones finer and harder than those of Munich. There are cutlery-works and a national arms factory at Châtellerault; forges, blast-furnaces, spinning-mills (both wool and hemp); and manufactories of serges and coarse cloth, paper-works, etc. Vienne is divided into the five arrondissements, Poitiers, Châtellerault, Civray, Loudun, Montmorillon. The capital is Poitiers.Pop. (1901) 336,-333.

VIENNE: town of France, dept. of Isère; on the left bank of the Rhone, 19 m. s. of Lyons by railway. The river Gère passes through the town, and here joins the Rhone, after supplying motive-power to mills and factories. Vienne is very ancient: it was the chief town of the Allobroges; is mentioned by Cæsar (*De Bello Gallico*, VII. 9), and by Martial, who terms it *opulenta Vienna*. At the time of the Roman emperors, it was the rival of Lyons (q.v.). Besides numerous water-conduits, etc., of Roman construction, there is a temple supposed to have been dedicated to Augustus, which is now used as a museum and contains Roman remains. There are also a Roman arch, remains of a theatre, and an obelisk, called L'Aiguille, 72 ft. high; and the Cathedral of St. Maurice, a stately Gothic building, with much delicate carving. There are manufactures of coarse woolens, and a good trade in wine. In 1312 a council was held here, in which Pope Clement V. pronounced the suppression of the order of the Templars.—Pop. (1901) 25,000.

VIENNE', HAUTE: department of France, formerly known as Haut-Limousin; bounded w. by the depts. of Vienne, Charente, and Dordogne; 2,130 sq.m. It is watered by the Vienne and its tributaries—the chief of which is the Gartempe. The surface is mostly level, but traversed by ranges of low hills, of which the Monts du Limousin, which traverse the s. of the dept., rise in their highest summit to 3,000 ft. The Mont de Puy-Vieux, the highest in the dept., is 3,200 ft. above sea-level. The climate is cold, humid, and frequently foggy. The soil is not fertile, and agriculture is in a backward condition; but domestic animals are reared in great numbers. Mines of iron, lead, and copper are worked, and china-clay, of

which there is an inexhaustible supply, is largely exported to Russia and America. About 6,000 men are engaged in porcelain-making. It is divided into four arrondissements —Limoges, Bellac, Rochechouart, and Saint-Yrieix; cap. Limoges.—Pop. (1901) 381,753.

VIEQUES, or Crab Island, West Indies: a dependency of the United States; administratively, a district of the Department of Humacao, Porto Rico; a fertile island with several commodious ports where the largest ships can ride at anchor. It lies about 13 m. e. of Porto Rico; is 21 m. long and 6 wide; has a fine climate, and produces almost all varieties of fruit and vegetables that grow in the West Indies. The population of Vieques district (in which Culebra island was included as a ward) was given as 6,642 in the census of 1899; of the town called Vieques, 2,646. The principal settlement is located on a bay on the s.e. side; on the n. is the town of Isabel Segunda. Statistics of the island prepared under the direction of the war department of the United States in 1899 show: Native whites, 2,545; foreign whites, 138; negroes, 1,036; mixed, 2,923; married, 668; single, 4,539; living together as husband and wife by mutual consent, 1,185; widowed, 230; inhabitants 10 years of age and over who attended school, 162; 10 years of age and over who could neither read nor write, 3,288; superior education, 22; inhabitants engaged in agriculture or fisheries, 1,396; trade and transportation, 225; manufacturing and mechanical industries, 253; professional service, 39; domestic and personal service, 727; without gainful occupation, 4,002; total number of dwellings, 1,273; number of farms, 120.

VIETA, François: French mathematician: b. Fontenay-le-Comte 1540; d. Paris 1603. He practiced law until 1589, when he was appointed maître des requêtes under the parliament at Paris, subsequently holding various civil offices. He was the founder of modern algebra and the foremost algebraist of his time. His works were collected and published by Van Schooten (Leyden 1646).

VI ET ARMIS, phrase *vī ĕt âr'mĭs* [L.]: in *law*, with force and arms: in general, with force and violence.

VIEUXTEMPS, Henry: French composer and violinist: b. Verviers, Belgium, 1820; d. Mustapha, Algiers, 1881. He studied law at Vienna and at Paris, and made his first appearance at Paris in 1841. He visited the United States in 1844-5, 1856, and 1870, was solo violinist to the emperor of Russia in 1846-52, and in 1870 was appointed to a professorship at the Conservatoire at Brussels. A stroke of paralysis, however, in 1873, left his right arm useless and he was compelled to retire. He composed numerous pieces for the violin, comprising concertos, fantasies, and dances.

VIEW, v. *vū* [F. *vue*, sight, view—from *voir*, to see—

from L. *vidēre*, to see]: to examine with the eye; to look on with attention; to consider: N. sight; vision; the whole extent seen; scene; reach of sight; survey; design; purpose; examination; aim; manner of seeing or understanding; intellectual sight; a pictorial sketch; in *Ob.*, appearance. VIEWS, n. plu. opinion on any subject. VIEW'ING, imp. VIEWED, pp. *vūd*. VIEW'ER, n. *-ėr*, one who views; the superintendent or general manager of a coal-mine (used chiefly in Great Britain). VIEW'LESS, a. *-lĕs*, that cannot be viewed; invisible. FIELD OF VIEW, the whole extent seen. ON VIEW, exposed to examination, as articles for sale. POINT OF VIEW, the direction from which a thing is seen.—SYN. of 'view, n.': prospect; display; exhibition; intention; opinion; notion; design.

VIGAN, Philippines: pueblo and capital of the province of Ilocos Sur; on the northern delta of the Abra river about 3 m. from the coast. It is open to the coast trade, is on the west coast road connecting it with Dagupan, and the Dagupan and Manila railroad, and carries on an important trade with the interior of the province by means of the river. It contains brick kilns, a boat building yard, and a carriage factory. It has broad streets, and a number of important public buildings, including the casa real, court house, provincial administration building, and the council seminary; it has been an episcopal see since 1755, and contains a fine cathedral and the bishop's palace. Pop. (1901) 19,000.

VIGEVANO, *vē-jā'vâ-nō:* town of n. Italy, province of Pavia; 15 m. s.e. of Novara, 24 m. s.w. of Milan. It stands on rising ground on the banks of the Mora, not far from the Ticino. It is a walled town; has an arcaded market-place, a cathedral, and a castle of the Sforza family, dating from the 14th century; manufactures silk, linen, and cotton fabrics; and has active trade in grain and wine. Pop. 15,000.

VIGFUSSON, GUDBRAND: Scandinavian scholar: b. Frakkanes, Iceland, 1827, Mar. 13; d. Oxford, England, 1889, Jan. 31. He was educated at Copenhagen University and lived in Copenhagen from 1849 till 1864, devoting himself to the study of old Icelandic literature. His first work, *Timatal*, on the chronology of the Sagas, was published in 1855. In 1858 he brought out the *Biskupa Sögur, or Lives of the Icelandic Bishops*, and in 1864 the *Eyrbyggja Saga*. He then went to England to undertake the Icelandic-English lexicon, on which he was employed from 1864 to 1871. In 1878 the Clarendon Press published his *Sturlunga Saga*, to which he prefixed the *Prolegomena*, containing a complete history of the classic literature of Iceland. This was followed by the *Corpus Poeticum Boreale* (with F. York Powell), a complete collection of the ancient Icelandic poetry, with translation. In 1848 he was appointed lecturer in Icelandic and kindred subjects at the University of Oxford.

VIGIL, n. *vĭj'ĭl* [F. *vigile*, vigil—from L. *vigilĭa*, wakefulness; *vigil*, on the watch: It. *vigilia*]: a keeping watch during the night: devotion performed during the usual hours of sleep: the eve before a festival; forbearance from sleep; watch. VIG'ILANT, a. *-lănt* [F.—L.]: watchful; attentive to discover and avoid danger. VIGILANTE, n. *vĭj'ĭ-lān'tē*, a member of a vigilance committee. VIG'ILANTLY, ad. *-lĭ*. VIG'ILANCE, n. *-lăns* [F.—L.]: forbearance of sleep; watchfulness; attention in discovering and preparing against danger; in *OE.*, guard; watch: ADJ. formed for protection, or for watching the progress of any measure or plan, as a VIGILANCE COMMITTEE.—*Vigil*, in ecclesiastical use, is a preparatory time of devotion, which, by an ancient Christian usage, preceded the more solemn festivals, especially Christmas, Easter, Pentecost, and the principal martyrs' days. In English, it was called 'Eve' or 'Even,' a name still retained in *Christmas Eve*, *Easter Even*, *Hallow-e'en*, etc. The observance is traceable in the early ages of the church, and seems to have been fully established in the 4th and 5th centuries. On the day before the great festivals, the people assembled in great numbers. The night was spent chiefly in the church and in prayer and other devotional exercises; but abuses arose, and these night-watches were suppressed, and certain festivities which had grown up in connection were abolished. The observance of vigils is retained in the Roman Catholic Church, and with it all the ecclesiastical offices, together with the fast, at least in the great vigils of Christmas, Easter, Pentecost, Saints Peter and Paul, Assumption, All Saints, etc.; but all the other details of the celebration have fallen into disuse. In the Anglican Prayer-book, the 'vigils or evens' of the chief festivals commemorative of the Lord Jesus, of the Virgin Mary, and of the Apostles are retained in the calendar, though without special services or other celebration. See Blunt's *Annotated Common Prayer*.

VIGILANCE COMMITTEE: a term used in the United States to denote a band of citizens organized to summarily punish crime, or prevent the commission of crime, in such instances as the civil and lawfully constituted authorities seem powerless to enforce the law. The most noted committees in the history of the country were those formed in San Francisco, and contiguous territory in the western states, and in New Orleans, in the southern states. In the earlier years of San Francisco the city was so overrun with the lawless element among the miners and adventurers that the administration of justice became in the hands of the constituted authorities but a travesty. It was then that the work of the vigilance committee, or vigilantes, as they were styled, began. That work was short, sharp, and terrible. Thieves and murderers were hanged on every side, while others were forced to seek safety in flight. In New Orleans the last instance of the organization of a vigilance commit-

tee was in 1891, when a body of citizens took from the city jail a number of Italians, suspected of being members of the Italian fraternity of murderers, known as the Mafia, and accused of being the murderers of Chief of Police David Hennessey, and put them to death by shooting and hanging. This action produced serious complications between the Italian government and that of the United States.

VIGILIUS: Pope: b. Rome; d. Syracuse 555. During the pontificates of Agapetus I. and Sylverius, Vigilius was *apocrisiarius* (an office nearly corresponding to the later one of papal nuncio) at Constantinople, and having sided with the imperial government against Pope Sylverius, was sent to Rome to procure the imprisonment and exile of Sylverius. This being accomplished, Vigilius was proclaimed pope in 537, but was not acknowledged by the entire church as such till 540, when Sylverius died. It has been said that, according to a promise given to the empress of Constantinople, he wrote in 538 a secret letter to the heads of the Monophysites, in which he approved of their views, and condemned the anti-Monophysite decisions of Pope Leo I. Modern critics all agree in pronouncing this letter apocryphal; and later (after 540) he refused to issue a decree in favor of the Monophysites, declaring that he would abide by the decisions of the four œcumenical councils and the decrees of Popes Agapetus and Leo. When Justinian, in 544, condemned the so-called 'Three Chapters' (the writings of Theodore of Mopsuestia, of Theodoret against Cyril, and the Epistle of Ibas), and the western bishops generally threatened resistance to this, Vigilius was summoned to Constantinople (546), and prevailed upon to condemn likewise the 'Three Chapters,' in a document called *Judicatum* (548); saving, however, the authority of the council of Chalcedon, which has refrained from condemning them. As this satisfied neither the opponents nor friends of the 'Three Chapters,' Vigilius called an œcumenical council, the fifth, to settle the dispute. In the eighth session, the 'Three Chapters' were condemned in nearly the same terms used by Pope Vigilius in his *Judicatum*. As a matter of prudence to allow the agitation occasioned by the controversy to subside, the Pope waited some months before announcing to the Catholic world that the 'Three Chapters' had been regularly condemned by the council. Vigilius then obtained the emperor's leave to return to Italy, but died at Syracuse on the way back.

VIGNAUD, Jean Henry: American diplomatist and author: b. New Orleans, La., 1830, Nov. 27. He taught in the schools of his native city in 1852-6, and at the same time wrote for *Le Courrier* and other papers. In 1857-60 he was editor of *L'Union de Lafourche* at Thibodeaux, La., and in 1860-1 was one of the founders and the editor of *La Renaissance Louisianaise*, a weekly journal. In 1861 he joined the Confederate army as captain

in a Louisiana regiment, and was captured at New Orleans in 1862. The next year he was appointed secretary of the Confederate diplomatic commission at Paris; in 1872 he was translator at the Alabama claims commission at Geneva; and in 1873 a delegate from the United States to the international metric conference. He was appointed second secretary of the American legation at Paris in 1875, and first secretary in 1882, retaining this position when the legation became an embassy. He has written: *L'Anthropologie* (1861); *Critical and Bibliographical Notices of All Voyages Which Preceded and Prepared the Discovery of the Route to India by Diaz, and to America by Columbus; Toscanelli and Columbus—the Letter and Chart of Toscanelli on the Route to the Indies by way of the West* (1902); *Toscanelli and Columbus—Letters to Sir Clements R. Markham and C. Raymond Beazley* (1903). The publication of his *Toscanelli and Columbus* provoked considerable controversy; its aim was to impugn the purely scientific origin of Columbus' discovery.

VIGNETTE, n. *vĭn-yĕt or vĭ-nĕt* [F. *vignette,* a flourish, a head-piece—from *vigne,* a vine—from L. *vinĕa,* a vine—*lit.,* a little vine, the first vignettes having been adorned with borders of vine-leaves and grapes]: in *Gothic arch.,* a running ornament or embellishment of vine-leaves, tendrils, etc.; in *books,* the small engraved embellishment, illustration, or decoration that precedes the title-page or chapters of a book, etc., originally bordered with a scroll of trailing plants or the like, hence the name; in general a picture, and specially a photographic portrait, displaying the head and upper part of the body only, and having no definite border, the ground shading off insensibly to an even color.

VIGNY, *vēn-yē',* Alfred, Comte De: French poet and novelist: 1799, Mar. 27—1863, Sep. 17; b. at Loches, in Touraine. He was educated at Paris, but joined the army at the age of 16. In 1826 he married a wealthy Englishwoman; and two years later withdrew from the army and applied himself to literature. Vigny belongs to the romantic school, but is free from their extravagance of style and sentiment. No modern French poet exhibits an equal refinement and delicacy; and scarcely any other has such classical precision and solidity of literary form with such elevation of sentiment. In his dramas he did not reach the same excellence. His principal works are: *Poëmes* (1822), *Poëmes Antiques et Modernes* (1824-26), among which are his famous *Moïse, Dolorida,* and *Elva;* also *Cinq-Mars* (1826), historical romance of the time of Louis XIII., greatly admired in France; *Stello ou les Biables Bleus* (1832); *Servitude* and *Grandeur Militaires* (1835)—two very striking and suggestive novels: *La Maréchale d'Ancre* and *Chatterton* (1835)—dramas of considerable merit. Besides these, he published *Consulta-*

tions du Docteur Noir (1856). A posthumous work, *Les Destinies, Poésies Philosophiques*, appeared 1864.

VIGO, *vē'gō:* ancient town and seaport of Spain, on the n.w. coast of the Bay of Vigo, about 85 m. n. of Oporto, 486 m. w. of Madrid by rail. Its climate renders it important as a sanitary station; and its position on the slopes of a hill, overlooking a charming bay, and forming the centre of a scene oriental in its wealth of palms, orange-groves, flowers, and orchards, makes it a delightful place of residence. Its narrow winding streets and quaint old houses give it picturesqueness. The country in the vicinity is exceedingly fertile, and fruits, grain, wine, and oil abound. The trade of the port—which is also a harbor of refuge—is large and increasing. It is a regular port of call for several international lines of steamers. About 2,500 vessels, of 300,000 tons, enter and clear annually. Pop. 18,000.

The Bay of Vigo has an inland sweep of 20 m., and is 5 m. wide at its mouth. The town has frequently been attacked by the English: by Drake 1585 and 89; by the Duke of Ormond, Rooke, and Stanhope 1702; and by Lord Cobham 1719.

VIGOR, n. *vĭg'ėr* [L. *vigor*, activity, force—from *vigērĕ*, to be lively or vigorous: It. *vigore:* F. *vigueur*]: vital strength in animals or plants; physical force; strength of mind; energy. VIG'OROUS, a. *-ŭs*, full of strength and life; strong; powerful; energetic; forcible; robust; active; brisk. VIG'OROUSLY, ad. *-lĭ*. VIG'OROUSNESS, n. *-nĕs*, the quality of being possessed of active strength.—SYN. of 'vigor': force; strength; efficacy.

VIHÂRA, *vĭ-hâ'râ:* Sanskrit word for a Buddhist monastery or convent, and in its usual more restricted sense for the 'temple' around which the monastic buildings are grouped. The word which is said to have originally designated the hall or halls where S'âkyamuni, the Buddha, and his followers used to meet has been variously explained, as 'expatiation,' 'recreation,' 'walking for pleasure or amusement,' the place where Buddhists 'walk with saudalled feet,' etc. See BUDDHISM.

VIKING, n. *vī'kĭng* [Icel. *vikingr*, a pirate, viking—from *vik*, a creek, bay, and suffix *-ingr*, of or pertaining to]: one of the piratical Northmen who infested the coasts of the British Islands and of France in the 8th, 9th, and 10th centuries. This word is quite unconnected with 'king,' being derived from the Scandinavian *vik*, a bay; and this class of marauders were so called because their ships put off, not from the lawful harbor, but from the bay. See NORMANS.

VILAYET, n. *vĭl-â-yct'* [Turkish]: the largest administrative division of the Turkish empire, having at its head a *vali* or governor-general; same as *Eyalet* (q.v.), which since 1866 it has superseded.

VILD, or VILDE, a. *vīld:* OE. for VILE.

VILE, a. *vīl* [F. *vil*—from L. *vīlis*, of small price or value, worthless: It. *vile*]: base; mean; worthless; depraved; morally impure; bad; villainous. VILE'LY, ad. *-lĭ*. VILE'NESS, n. *-nĕs*, the state or quality of being vile; baseness. VILIFY, v. *vĭl'ĭ-fī* [L. *facĭō*, I make]: to debase; to degrade or attempt to degrade by slander; to defame. VIL'IFYING, imp. VIL'IFIED, pp. *-fīd*. VIL'IFIER, n. *-fī-ẽr*, one who defames or traduces. VIL'IFICA'TION, n. *-fĭ-kā'-shŭn*, the act of vilifying or defaming.

VILIPEND, v. *vĭl'ĭ-pĕnd* [F. *vilipender*, to contemn—from L. *vilipendĕrĕ*, to depreciate or despise—from *vilis*, paltry, vile; *pendo*, I weigh or value]: to despise; to contemn; to depreciate in a paltry way. VILIPEND'ING, imp. VILIPEND'ED, pp.

VILKOMIR, *vĭl-kō-mēr'*, or WILKOMIERZ, *vĭl-kō'mē-ärzh:* town of w. Russia, government of Kovno; on the Swenka, 130 m. s.e. of Riga. It was a flourishing town in the 13th century, and continued prosperous till the 17th century, when it began to decline, in consequence of the wars with Sweden, Russia (Vilkomir being at that time a Polish town), and the Cossacks. Vilkomir contains an ancient church of the 13th century. Flax is exported to Riga. Pop. 19,000.

VILLA, n. *vĭl'lâ*, VIL'LAS, n. plu. *-lâz* [L. *villa*, a country-house, dim. of *vīcus*, a village]: a country residence; a detached suburban or rural residence of considerable pretensions, standing in grounds of some size. In the time of the Romans, the villa was a cluster of buildings in the country, forming a sort of private town, and the residences of the proprietor, farmer, and servants, and all the necessary offices and other accommodations for the cattle—the gardens, pleasure-grounds, etc.; a house in a town surrounded by a garden or grounds. VILLAGE, n. *vĭl'lāj* [F.—from *villaticus*, pertaining to a country-house or villa]: an assemblage of houses less than a town, but larger than a hamlet. VIL'LAGER, n. *-lă-jẽr*, an inhabitant of a village. VILLAGERY, n. *vĭl'-lă-jẽr-ĭ*, in *OE.*, a district of villages.

VIL'LA DEL PRIN'CIPE. See PUERTO PRINCIPE.

VILLAFRANCA, *vĭl-lâ-frân'kâ:* small town of n. Italy, province of Verona; 9 m. s.w. of the city of Verona; on the left bank of the Tartaro. It was formerly a place of great strength; but is now notable chiefly as the place where was signed (1859, July 11) the treaty of peace between the emperors of France and Austria, which ended the Italian war of that year. Pop. 5,000.

VILLAGE COMMUNITIES: supposed upon ample evidence in the present as well as the past, to have been the primitive form of organized human society. In Africa, the South Sea Islands, and among the American aborigines who have progressed beyond savage isolation, the village community exists, a survival of a system

which was probably universal in the prehistoric period, and was prevalent throughout a large part of Europe, as it is to-day in Russia, long after Greece and Rome had built flourishing cities, and established new forms of civilization. In the Russian *mir*, a word which signifies union, all the land is held in common, and is divided for use among the several families. Such was the system of land tenure among the ancient German tribes, when they first came within the observation of the Romans, and although at a very early date—probably before the tribes from the north swept down on the Roman dominions—private proprietorship of land had become a fixed institution among them—the village continued to have its common or 'green,' which every villager had a right to use and enjoy. This communal land system was brought to the new world by the first settlers, being represented by the Boston Common, and the 'commons' of New York now known as City Hall Park, and other similar public reserves.

It is unnecessary to trace the village community from its primitive condition through the feudal and more recent periods to the present day. Throughout all changes something of the commercial system survived, and the common enjoyment of land, which had been nearly effaced by private proprietorship, is being revived in the creation and the extension of public parks, open to every citizen. In Russia, on the other hand, the *mir*, or village community, is giving way to private proprietorship, Russia in this, as in some other respects, being in a period of transition from which western Europe evoluted centuries ago.

VILLAGRAN, or VILLAGRA, FRANCISCO: Spanish soldier and colonial governor: b. Astorga, Spain, 1507; d. Concepcion, Chile, 1563. He accompanied Valdivia to Peru, was engaged with him in the conquest of Chile in 1540-5, and in 1547-9 was deputy governor in the absence of Valdivia. Upon the death of Valdivia in the Araucanian uprising of 1553-4 Villigran became governor. While proceeding to march against the Araucanians was severely defeated at Mariguenu in February, 1554. He, however, continued the war for months, killing the famous Indian chief Lantaro at Mataquito in 1556. He was superseded by Garcia Hurtado de Mendoza in 1557; and that governor, in order to be rid of his dangerous rival, sent Villigran a prisoner to Peru. On his release he went to Spain, secured a royal commission to succeed Mendoza and returned in 1561 to take charge of the colony. He pushed the Spanish conquests beyond the Andes, and though much harassed by the uprisings of the Araucanians, continued in office until his death.

VILLAIN, n. *vĭl'an* [F. *vilain*, a boor, a rascal—from mid. L. *villani*, the inhabitants of *villæ*, or country estates, who could be sold with the land (see VILLA)—the peasants under the feudal system being held in supreme

contempt, led to the bad sense of the word in modern language]: a vile, wicked person; a man extremely degraded or depraved, and capable or guilty of great wickedness. VIL'LAINOUS, a. *-ŭs*, proceeding from an extremely depraved mind; very wicked; vile; in *OE.*, sorry. VIL'LAINOUSLY, ad. *-lĭ*. VIL'LAINOUSNESS, n. *-nĕs*, the state or quality of being villainous. VIL'LAINY, n. *-ĭ*, extreme wickedness; any crime proceeding from an extremely depraved mind; a crime. VIL'LANIES, n. plu. *-ĭz*, wicked actions. VILLEIN, or VILLAIN, n. *vĭl'an*, a feudal tenant of the lowest class; a Serf (q.v.); a *villein regardant* was one attached to a manor, while a *villein in gross* belonged to his lord and was unattached to any territory (see FEUDAL SYSTEM; COPYHOLD; SLAVERY). VIL'LENOUS, a. *-ŭs*, pertaining to a villein or serf. VIL'LEINAGE, or VIL'LENAGE, n. *-āj*, state of a villein; lands and tenements held by base service.

VILLANOUS, VILLANY: spellings of VILLAINOUS, VILLAINY.

VILLARD, *vĭl'ėrd*, HENRY: financier: b. Spires, Bavaria, 1835, Apr. 11; d. 1900, Nov. 11. He was educated in the universities of Munich and Würzburg; settled in the United States 1853; studied law; then engaged in journalism. He wrote an account of the Pike's Peak gold regions 1859; was war-correspondent 1860-65; then European correspondent till 1868. Visiting Germany 1870, he there acted as agent of sundry American financial interests of railroad securities. He returned to this country 1874, as representative of German holders of bonds and stocks, and, visiting Oregon, gained for his German clients control of the Oregon and California railroad and the Oregon Steamship Co., becoming president of both. In 1876 he was appointed receiver of the Kansas Pacific railroad; 1879 he amalgamated three railroad and navigation companies, as the Oregon Railway and Navigation Co., and soon afterward obtained control of the Northern Pacific railroad, whose president he became 1881. The Northern Pacific was opened for traffic with much *éclat* 1883, Sept.; but 1884, Jan. 4, Villard perforce resigned the presidency under the 'bears'' attack on the property. In 1889-93 he was chairman of the board of directors. He organized (1890) the Edison General Electric Co., and was its present for two years.

VILLARI, *vēl-lâ'rē*, PASQUALE: Italian historian: b. Naples 1827, Oct. 3. After the failure of the Neapolitan revolution (1848-9), in which he had taken part, he was compelled to escape to Florence, where he wrote his *Storia di Girolamo Savonarola e de' suoi Tempi* (1859-61), which soon gained for him a European reputation. In 1859 he was appointed professor of history in the University of Pisa, and in 1866 received a similar chair in the Institute di Studj Superiori of Florence. Besides having frequently served in the Italian parliament as deputy, he was general secretary of public education in

1869, was made senator in 1884, and in 1891 was minister of public education. Among his many works are: *Leggende che Illustrano la Divina Commedia* (1865); *Loggi Critici* (1868); *Niccolò Machiavelli e i suoi Tempi*, a work of great value (1877-82); *Arte, Storia, e Filosofia* (1884); *I Primi Due Secoli dell Storia di Firenze* (1893-4). He is recognized as a historical investigator of wide research and excellent scholarship. Several of his works have been translated into English by his wife, Linda White Villari.

VILLARS, *ve-lâr'*, Claude-Louis-Hector, Duc de: French general: 1653, May 8—1734, June 17; b. Moulins, department of Allier; of noble family. He studied at the college of Juilly. Later he entered the army as a volunteer, and saw service first in Holland, where, having attracted Louis XIV.'s attention by his daring courage and striking figure, he obtained a troop of horse 1672; served for two years under Turenne in Germany, and after the battle of Seneffe received a regiment of cavalry, when yet in his 21st year. After further service under Luxembourg and Crequi, he returned to Paris with high military reputation. During the next ten years (1678-88) he was employed in diplomatic service, chiefly at the court of Bavaria. In 1688 Louvois appointed him commissary-general of cavalry; and in the war which followed the league of Augsburg, placed him at the head of the cavalry in Flanders. He represented France at the court of Vienna 1699-1701, foiling by his vigilance and penetration the tortuous policy of the Austrian ministers. On his return he was employed in Italy under Villeroi; and after brief service under Catinat was for the first time (1702) raised to independent command, when he was sent to succor the Elector of Bavaria, who had taken up arms on the side of France. Toward the close of 1702 Villars crossed the Rhine, defeated the Markgraf of Baden at Friedlingen, took Treves, Traerbach, and Nancy; and early in the following year again crossed the Rhine, traversed the almost impassable defiles of the Black Forest, and debouching from the mountains at Villingen, joined the elector near Dutlingen May 12. His bold and well-conceived scheme for carrying the war into the enemy's country, by advancing on Vienna while so many Austrian troops were employed on the middle Rhine, in Italy, and against Ragotski in Hungary, was foiled by the stupid obstinacy of his colleague, the elector, and after his skill and genius had been tasked to the utmost to keep the Austro-Germans under the Markgraf of Baden and Stirum at bay, and he had been relieved by the return of his ally (who had been defeated by the Tyrolese mountaineers), he reopened his line of communication westward, and, leaving Marsin in command, returned in disgust to France. He was next commissioned to put down the insurrection of the Camisards (q.v.). Villars' manly moderation and soldierly frank-

ness fairly won over Cavalier, the ablest of the insurgent leaders; and the difficulty was brought to an end or reduced to insignificant proportions. Villars was then sent to watch over the n.e. frontier, and took post on the heights of Fronsberg, when Marlborough advanced upon him with 110,000 men; but Villars had shown such skill and strategy in selection and fortification of his position, and remained so strictly on the defensive, that the great English general declined to risk an attack, and retreated; whereupon Villars burst into Alsace, captured the enemies' reserves of supplies and artillery, and advanced to Rastadt and Stuttgart. In 1707 Villars was severely wounded at the beginning of the battle of Malplaquet (q.v.). In 1711 he returned to his post, headed the last army that France could raise, and with it fell upon the British and Dutch under Albemarle, intrenched at Denain (1712, July 24), carried their intrenchments sword in hand, and captured most of them; he then turned on Prince Eugene, and drove him to Brussels. This series of magnificent successes saved the honor and even the national life of France, and brought about the peace of Rastadt (see UTRECHT), which Villars signed as plenipotentiary, 1714, May 6. After the peace he became, at court, the principal adviser on military affairs and foreign policy; but was finally supplanted by Fleury. The outbreak of war 1732 brought the old hero from his retirement, and with the title of 'Marshal-general of the Camps and Armies of France' he headed the French force in the Milanese. The campaigns of 1733-4 showed that the years had left Villars's military genius and spirit untouched. On his return to France he fell ill at Turin, and died there. Villars was the last of the great military geniuses of the French monarchy, and was wholly free from the restless anxiety for *éclat* which detracts from the merits of so many of them. As a general, he possessed in a high degree quickness of apprehension, skill in disposition, and promptitude (without precipitancy) in action. He was humane, sincere, and self-reliant. His Memoirs have been printed in Holland, and his Autobiography by Anquetil.

VILLARSIA, *vĭl-lâr'sĭ-a:* genus of gamopetalous plants, nat. order *Gentianaceæ*, whose species are widely distributed over the world, and are either aquatic or marsh plants, with entire leaves and yellow flowers. *V. nymphæoides* is common in many parts of Europe, from Denmark to the Mediterranean; and is very abundant in Holland, often covering large tracts of the canals with its beautiful flowers and leaves. It is easily cultivated, and abounds in s. Siberia.

VILLATIC, a. *vĭl-lăt'ĭk* [L. *villātĭcus*, of or belonging to a country-house; *villa*, a country-house]: in *OE.*, belonging to villages; village or rustic.

VILLEINS: a species of serfs who grew up along with the feudal customs of Europe. A feudal lord re-

ceived from his superior, on condition of military service, a grant of conquered land, which he distributed among his dependents on two distinct tenures or classes of tenure. The freemen, who were the kindred or followers of the conqueror, received their land on the same condition of military service as himself. The conquered or the serfs who were not directly employed in domestic or personal service were allowed to cultivate the land on the tenure of menial or non-military services, either determinate or indeterminate. Such is the simple origin of villenage. In some cases the villeins were at the absolute disposal of their lord, who could sell them or deal with them as he pleased. In others they were attached to the soil, and formed part of its movable wealth. Sometimes they held by defined services, such as making and repairing roads, felling timber, or cultivating the lord's domain; but even then the control of justice was commonly in the hands of their lord, against whose oppression they had no redress. Hallam says that in England they were incapable of property; yet even in England, when the laws began to extend their protection to personal rights, the association of the villeins with the soil established a good tenure of property, subject to customary services, which were finally commuted into money rents. Villenage appears to have died out in England, without special legislation to abolish it. The system of agricultural labor under yearly contract, with violation of contract on the part of the laborer punishable by imprisonment, which continued in England down to the latter part of the 19th century, partook essentially of villenage, as the laborers had either to face prosecution as vagrants, or renew each year the obligation of servitude, which might fairly be called involuntary.

Villenage—if the involuntary servitude of white persons not convicted of crime comes within that term—has never existed in the United States, except in the form of indentured apprenticeship, which in colonial days was practically serfdom, and of the form of servitude known as 'redemption,' when immigrants were sold and bound out for a term of years to pay the expenses of their passage. 'Redemption' servitude existed long after the United States became independent, and many respectable and even prominent families are descended from 'redemptioners.'

The peons of Mexico and New Mexico were villeins attached to the soil. Peonage was abolished in the United States Mar. 2, 1867.

VILLEMAIN, *vēl-măng'*, Abel François: French scholar and writer: 1790, June 11—1867, May 8; b. Paris. He was educated at the Lycée Impérial (now the Lycée Louis-le-Grand); was appointed, 1810, extraordinary professor of rhetoric at the Lycée Charlemagne, which post he soon exchanged for one at the Ecole Normale. Three of his literary essays were crowned by the French Acad-

emy 1812-16—the *Eloge de Montaigne, Avantages et Inconvénients de la Critique,* and *Eloge de Montesquieu.* In 1816 he was appointed to a chair of modern history at the Sorbonne, as assistant to Guizot, from which he was transferred to the chair of eloquence (1816-26). In 1819 he published *Histoire de Cromwell d'après les Mémoires du Tempts et les Recueils Parlementaires* (2 vols.)—a work written in a calm and liberal spirit. Louis XVIII. took notice of the author, and Villemain was induced to enter on a political career. The post assigned him was a delicate one—involving a kind of censorship of the press. Under the ministry of Decazes, he held the office of maître des requêtes to the council of state, and 1820 was decorated with the Legion of Honor. Two years later appeared his translation (with preliminary essay and notes) of the *Republic* of Cicero; and 1825 a drama, *Lascaris, ou les Grecs du XV. Siècle,* and an *Essai sur l' Etat des Grecs depuis la Conquête Musulmane.* In 1827, having gradually passed over to the ranks of the liberal opposition, he, with Lacretelle and Chateaubriand, was appointed to draw up the petition of the French Academy to Charles X. against the re-establishment of the censorship of the press. This resulted in the loss of his appointment as maître des requêtes, and, in consequence, great increase of his popularity as lecturer at the Sorbonne. In 1830 he was sent to the chamber of deputies by the electoral college of Evreux, took his seat among the liberal party, signed the famous address of the 221, and was very prominent in the movements which brought in the constitutional monarchy of Louis Philippe. But he was too sober, unsympathetic, and philosophical, too much a *doctrinaire* of the Guizot school, to be a favorite with the excitable masses; and he sat in the chamber for only one year. In 1831 the king named him member of the royal council of public instruction, of which he became vice-president 1832. In the same year he was raised to the peerage. Villemain held the portfolio of public instruction in the ministries of Soult (1839-40) and Guizot (1840-44); but his health failed under the great labors of his department, and the impossibility of pleasing so many parties—the church, the university, the reds, the liberals, the doctrinaires, as well as the king himself; and he found it necessary to resign. From that time Villemain applied himself to literature alone. His principal works are: *Cours de Littérature Française, Tableau du XVIII. Siècle, Discours et Mélanges Littérairies* (1823); *Nouveaux Mélanges Historiques et Littéraires* (1827); *Etudes de Littérature Ancienne et Etrangère* (1846); *Tableau de l'Eloquence Chrétienne au IV. Siècle* (2d ed. 1849); *Etudes d'Histoire Moderne* (1846); *Souvenirs Contemporains d'Histoire et de Littérature* (1856); *Choix d'Etudes sur la Littérature Contemporaine* (1857); *La Tribune Contemporaine, M. de Chateaubriand* (1857); *Essais sur le Génie de Pindare et sur la Poésie Lyrique* (1859); besides

numerous Essais, Etudes, Discours, Notices, and Rappors addressed to the French Academy, of which he was perpetual secretary from 1832. Villemain's elaborate *Histoire de Grégoire VII.*, nearly finished at the time of his death, was published 1872. He died at Paris. Villemain's popularity was immense: he met the literary demands of his time. He was a pleasing writer, discursive in range, eclectic in taste, though not specially original in thought or peculiarly charming in style.

VILLENEUVE, *vēl-nŭv′*, PIERRE-CHARLES-JEAN-BAPTISTE-SYLVESTRE DE: French admiral: 1763, Dec. 31—1806, Apr. 22; b. Valensoles, department of Basses-Alpes; of ancient and noble family. Villeneuve entered the navy in his 15th year, and passed as captain 1793. In 1796 he was raised to the rank of 'captain of division' (equivalent to *commodore*), and commanded the rear division at the battle of the Nile. In 1804 he was nominated vice-admiral; and in the following year was appointed to the command of the Toulon squadron. Having sailed to the Azores, he encountered a British squadron, under Sir Robert Calder, and a fierce fight ensued, which lasted till dark. On the following morning, neither side cared to renew the engagement (for which Villeneuve was abused by *Le Moniteur*, and Admiral Calder was put on trial), and Villeneuve, unable to reach Brest, returned to Cadiz, where he was strictly blockaded by Nelson. The severity with which he was treated by Napoleon on account of these reverses, and the further indignity of being superseded, goaded Villeneuve into the desperate resolve of engaging Nelson before his successor could arrive at Cadiz. The memorable conflict of Trafalgar (see TRAFALGAR; NELSON) was the result. Villeneuve, whose vessel, the *Bucentaure*, was completely dismasted, was forced to strike his flag; and was made prisoner, and conveyed to England, whence he returned to France 1806, Apr. He stopped at Rennes, with the view of ascertaining the kind of reception he was likely to meet at Paris from the emperor. The result of his inquiries was unfavorable; and on the morning of Apr. 22 he was found dead in bed, with six knife-wounds in his heart, inflicted by his own hand.

VILLENEUVE D'AGEN, *vēl-nŭv′ dâ-zhŏng′*, or VILLENEUVE-SUR-LOT, *-sür-lō′*: town of France, department of Lot-et-Garonne; in a charming valley, 22 m. by rail n. of Agen. The river Lot, which flows through the town, is here crossed by a remarkably bold bridge of a single arch, with span of 118 ft. and height of 59 ft. The town, formerly called Gajac, was completely destroyed in the wars of the early part of the 13th century. When rebuilt it received its present name. A great trade is carried on in wines, prunes, cattle, and iron, and there are manufactures of paper, cloth, table-linen and copperwares. Pop. (1901) 14,000.

VILLI, n. plu. *vĭl′lī* [L. plu. of *villus*, wood or hair]:

in *anat.*, minute projections from the surface of a mucous membrane, giving the appearance of a nap of cloth; in *bot.*, long straight hairs on the surface of a plant. VIL'LOSE, a. *-lōs*, or VIL'LOUS, a. *-lŭs*, in *bot.*, covered with long weak hairs; shaggy; in *anat.*, downy; velvety. VILLOSITY, n. *vil-lŏs'ĭ-tĭ*, the state of being covered with *villi*. VIL'LIFORM, a. *-lĭ-fawrm* [L. *forma*]: resembling or having the form of *villi*. VILLUS, n. *vĭl'lŭs*, in *anat.*, one of the conical projections of the mucous membrane of the small intestines.

VIL'LIERS, GEORGE. See BUCKINGHAM, Duke of.

VIL'LIERS, GEORGE WILLIAM FREDERICK. See CLARENDON, Earl of.

VILLISCA, Iowa: city in Montgomery co.; at the confluence of the east and west branches of the Nodaway river, and on the Chicago, Burlington and Quincy railroad; 16 m. e. of Red Oak, and 15 m. n. of Clarinda. The city is in a rich agricultural region; in the vicinity are deposits of fire-clay and soapstone. The chief manufactures are clay products, which include brick and tile, and flour and dairy products. There are large shipments of fruit, wheat, corn, hay, vegetables, butter, eggs, poultry, and live-stock. There are two banks, a national and a private, having a combined capital of $100,000, and deposits amounting to $534,910. Pop. (1890) 1,744; (1900) 2,211; (1910 est.) 2,400.

VILLON, FRANÇOIS: French poet: b. Paris 1431; d. about 1484. His real name was François de Montcorbier, but he adopted the name of his guardian, Guillaume de Villon, a priest. He received the degree of master of arts in 1452, and three years later fled the country because he had killed a priest. He was pardoned in 1456 when it had become clear that the deed was done in self-defense, but immediately afterward he engaged in a series of extensive robberies, for which he was condemned to death. While lying in prison awaiting the execution of his sentence he wrote the epitaph in which he depicts himself and his companions suspended on the gibbet. His sentence was, however, commuted to banishment, but in 1461 he was again in prison, this time at Meung, perhaps for sacrilege. He was set free in October of that year in consequence of a jail delivery ordered by Louis XI. on the occasion of his visit to the town. Nothing is known of his subsequent career. His works include *Le Petit Testament* (1456) *Le Grand Testament* (about 1461); and numerous ballads. The first dated edition of his works is that of 1489, and of recent editions the best are those of Moland (1879) and Longnon (1892). There is an English translation of much of his best work by John Payne (new ed. 1892). Andrew Lang, Swinburne, and others have also made renderings.

VIL'NA, or WILNA, Russia: (1) capital of the government of the same name, on the Vilia, 415 m. s.w. of

St. Petersburg. It is picturesquely situated, partly on hills, partly on the banks of the river, and contains numerous convents and churches. The most notable buildings are the governor's palace, the town-house, and the buildings of the now suppressed university. The Greek and the Roman Catholic cathedrals are also worthy of notice. Educational institutions are numerous. The manufactures include tobacco, lead pencils, hats, leather, etc., and there is an extensive trade in grain and timber. Vilna dates from the 10th century. Pop. (1897) 154,532. (2) The government, which lies on the Baltic, has an area of 16,421 sq.m. and a population (1897) 1,591,912.

VIM, n. *vĭm* [L. accusative of *vis*, strength, force]: vigor; energy; force (*colloq.*).

VIMINAL, a. *vĭm'ĭ-năl* [L. *viminālis*, pertaining to osiers—from *vimen*, a pliant twig; *viĕō*, I bind]: pertaining to or consisting of twigs. VIMINEOUS, a. *vī-mĭn'ĕ-ŭs*, made of or furnished with twigs or flexible shoots.

VINACEOUS, a. *vī-nā'shŭs* [L. *vinum*, wine]: belonging to wine or grapes; of the color of wine.

VINAGO, *vī-nā'gō:* genus of fruit-pigeons, family *Columbidæ*, the members of which have a comparatively stout solid bill, laterally compressed; with a hard, hooked, and inflated tip; the tarsi short; feet large, and formed for perching or grasping. The species, of which not many are known, are natives of tropical Asia and Africa: they inhabit forests, and are shy and timid.

VINAIGRETTE, n. *vĭn-ā-grĕt'* [F.—from *vinaigre*, vinegar—from *vin*, wine; *aigre*, acid, sour]: a small box or bottle (the inner cover of which is perforated) for containing a bit of sponge saturated with aromatic vinegar or the like, used to stimulate or refresh by the sense of smell.

VINALHAVEN, Maine: town in Knox co.; about 13 m. e. of Rockland, the county-seat. The town is made of several small islands in Penobscot Bay. The granite quarries are a source of income to the town. The place is a favorite summer resort. Pop. (1910) 2,334.

VINASSE, n. *vĭ-năs'* [F. *vinasse*, dregs of pressed grapes—from L. *vinacca*, a grape-skin—from L. *vinum*, wine]: the potash obtained from the residue of a wine-press; also, the liquor remaining in a still after the process of distillation.

VIN'CA: genus of plants of the nat. order *Apocynaceæ*. See PERIWINKLE.

VINCENNES, *vĭn-sĕnz':* city, capital of Knox co., Ind.; on the Wabash river, and on the Cleveland, Cincinnati, Chicago and St. Louis, the Evansville and Terre Haute, the Indianapolis and Vincennes, and the Ohio and Mississippi railroads; 51 m. n. of Evansville, 58 m. s. of Terre Haute. It is on a sandy plain above high-water

mark, its site rising to a picturesque plateau under high cultivation, on which are three of about 800 mounds in Knox county, which, as remains of a former civilization, have attracted wide scientific interest. The city has improved water-works, gas and electric light plants, and street railroads. The chief manufactures are flour, lumber products, sewer-pipe, brick, tile, wrapping paper, iron and tin products, agricultural implements, cement, plaster, and foundry and machine shop products. The city is laid out in squares, with streets nearly all 50 ft. wide. Harrison Park, the plaza at the city-hall, and the Court-House Square are the chief park-lands owned by the city. The principal public buildings are the county court-house ($400,000), the city-hall ($100,000), the government building, the old hall where the legislature met, the house occupied by William Henry Harrison when he was governor of the territory, the church once used as the Roman Catholic Cathedral, the Vincennes Sanatorium, and St. Vincent's Orphanage for Boys. The educational institutions are two high schools, one for white pupils and one for colored (1882), Vincennes University, founded in 1806, St. Rose Academy (R. C.), public and parish graded schools, a public library, and three school libraries. There are three national banks and one state bank, having a combined capital of $375,000. The national banks have deposits amounting to $3,331,470. The government is administered under the charter of 1867, which provides for a mayor, who holds office two years, and a city council.

Population.—In 1890 Vincennes had a population of 8,853, and in 1900, 10,249; (1910) 14,895.

History.—In the vicinity of Vincennes are many Indian mounds. The first missionaries and explorers, who entered this part of Indiana by way of the river, found, where is now the city, an Indian village called Chip-kaw-kay. Vincennes is the oldest place in the state. In 1702, the French built here a fort, and for several years it was the seat of the empire of France in the Ohio valley. French from Canada settled here, and the place was called 'The Post' for over 30 years, when the name was changed to Vincennes, in honor of François Morgan de Vinsenne, who had been one of the officers of the fort. In 1763 the British obtained possession of the place, but owing to disturbed conditions in the east, Gen. Gage gave the fort but little attention, so Vincennes had only a self-government until 1777, when, on May 19, Lieutenant-Governor Abbot, of Detroit, arrived and took possession. He called the place Fort Sackville. The British incited the Indians to attacks on the whites who were under French rule or who were in rebellion against Great Britain. George Rogers Clark, of Kentucky, desiring to protect his country from those disastrous attacks, conceived the plan of capturing Detroit, Vincennes, and Kaskaskia, and submitted his plan to Patrick Henry, then governor of Virginia. After much

argument on the part of Clark and hesitancy on the part of Henry, the governor authorized Clark to recruit 350 Virginians for the expedition, and gave him money and ammunition. Clark proceeded with the undertaking, and 1778, July 4, captured Kaskaskia. With the aid of Father Gibault, of Kaskaskia, Clark secured the good will of the French people of Vincennes. In 1779 Clark's Virginians took possession of Fort Sackville. It was some time before the British in Detroit heard of the changes in the Ohio valley. Then a force of 500 regulars and Indians under the British commander, Henry Hamilton, embarked for Vincennes. Capt. Helm, in charge of the place, did not learn of the approach of the British until they were within three miles of the fort. His garrison consisted of himself, a few inhabitants, and one American soldier. The inhabitants went to their homes and Helm planted his two cannon; he took charge of one, and the remainder of his force stood by the other. When Hamilton demanded a surrender, Helm said no man could enter the fort until the terms of surrender were made known. Hamilton promised them the honors of war and then Helm and his force of one man surrendered. Clark did not hear of the fate of Helm for some time. Francis Vigo (after whom the county is named), a merchant of St. Louis, and a patriotic American, offered to go to Vincennes to attend to furnishing the garrison with supplies in accordance with Helm's request, sent to Clark before the arrival of the British. When Vigo approached Vincennes he was more than surprised to learn that the place was in possession of the British, who at once arrested him. He demanded release on the ground that he was from St. Louis, but Hamilton retained him until it was discovered that the French inhabitants would cut off the source of supplies for the soldiers unless Vigo were released. Vigo was finally given his freedom, on condition that 'on his way to St. Louis he would do no hostile act to the British interest.' This he promised, and at once took a canoe, descended the Wabash to the Ohio, then to the Mississippi, and arrived at St. Louis without breaking his pledge. As the boat touched the shore, Vigo sprang on land, then back into the boat, and started for Kaskaskia, to inform Clark about Vincennes. Clark saw at once that unless something was done, the whole Ohio valley would be lost to America. Desperate measures were resorted to, for transporting a small force of poorly clothed men was difficult at any time, but almost impossible in winter. On Feb. 5, 1179, he sent 64 men by boats, carrying provisions and ammunition, and with 170 men they began a march of 200 miles. There were no tents, no towns or even settlements where they were sure of finding friends. All the inhabitants of Kaskaskia accompanied them the first few miles of the journey; then soldiers and citizens knelt and the parish priest gave them his blessing, and Clark and his men marched

on to Vincennes, leaving the people on their knees praying for the success of the American nation. On the 23d of February Clark and his men arrived at the heights back of Vincennes, and sending word to the French inhabitants that they were there, the hungry soldiers were soon supplied with provisions. That night the Americans marched into the town and at once began an attack on the fort. The next morning Hamilton surrendered, and the American flag was placed on the fort, and then and there the name was changed from Fort Sackville to Fort Patrick Henry. The place was held by Virginia until 1783, when it was ceded to the United States. In 1787 the first court was held in the place, and in 1800 the Indiana territory was established and Vincennes was made the capital. In 1813 the territorial capital was removed to Corydon. A university and a library had been established. The first church in the Northwest Territory was built in Vincennes, in 1742, by Father Meurin, from France. The first school in Indiana was established here by Father Rivet.

Vincennes brought to the United States the great middle west and made the Louisiana purchase a possibility. Had it not been for the bravery, intelligence, and patriotism of George Rogers Clark and his Virginians, and the devoted French of the Ohio valley, the western limit of the United States would have been, for many years at least, the Alleghany Mountains. But Vincennes has done more for the preservation and extension of the Union; here Aaron Burr received his first and most decided check when he sought to break up the Union. The first provision made by any government for the care of the insane was made by the Indiana constitution, and to Benjamin Parke of Vincennes is due the credit of inserting the clause regarding the matter. Not only may Vincennes, 'on the banks of the Wabash,' be called 'The Key to the Northwest,' but also a historic city that was the scene of many heroic deeds. Consult: Law, *The Colonial History of Vincennes;* Smith in Powell's *Historic Towns of the Western States.*

VINCENNES, *văng-sĕnn':* market-town of France, department of Seine; 4 m. e.s.e. of Paris. In reality, Vincennes is merely a great fortress and barracks, noted for its arsenal; and for its school for rifle and artillery practice, at which the Chasseurs de Vincennes and all the best marksmen of the army are trained.

Vincennes owes its historical importance to its castle and park. The chateau, the main object of interest, is rectangular in shape, and dates from the middle of the 14th century. It was surrounded by 9 towers, which were standing till 1808, but of which only one remains—the Donjon de Vincennes, 170 ft. high, with walls 17 ft. thick. The original building dates from the reign of Louis VII., and had its origin in a hunting-lodge, erected here 1137. Philippe Auguste enlarged it, and stocked its woods with wild animals, sent to him by the king of

England. Here Queen Jeanne (wife of Philippe le Bel), Louis le Hutin, and Charles le Bel ended their days. Philippe de Valois caused the old mansion to be demolished, and laid the foundation of the more modern chateau, which, from the middle of the 14th century till the time of Louis XV., was a royal residence, and the birthplace and place of death of many princely personages. After this time it was used as a prison, and among the famous men who have languished within its donjon were Henry IV., the Prince of Condé, Cardinal de Retz, Mirabeau—who here wrote his translation of Tibulius—and the Duc d'Enghien, who was shot in the moat of the castle by order of Bonaparte. There are extensive barracks, known as the New Fort, built 1848-52, and a Salle d'Armes, with a large collection of all sorts of weapons. In the centre of the Bois de Vincennes, a large tract has been cleared as an exercise-ground for troops, and for rifle and artillery practice. Pop. (1901) 31,405.

VINCENNES, *vĭn-sĕnz'*, F. *văng-sĕn'*, JEAN BAPTISTE BISSOT, Sieur DE: explorer: 1688, Jan.—1736; b. Quebec. As a boy of 10 years he fought against the Iroquois at Mackinaw, and was commissioned ensign at 13. He rendered valuable service in the Miami country 1704; saved Detroit when attacked by the Fox Indians 1712; then till 1725 was employed in the Miami country and the territory now comprised in the states of Ohio and Michigan; thereafter he lived at the site of the city in Indiana which bears his name. He joined the expedition against the Chickasaws with a force of Miamis 1836; through the failure of the main force to appear at the rendezvous in the Illinois country, Vincennes and D'Artaguette were compelled to face the whole strength of the Chickasaws. The French repulsed the attack with great loss to the Chickasaws; but Vincennes's force was induced to desert, and he, with D'Artaguette and a priest, Father Sénat, was burned at the stake.

VINCENNES UNIVERSITY: located at Vincennes, Ind. It owes its establishment to a grant of land made by congress in 1804 in the Vincennes land district for the use of a seminary of learning. In 1806 Vincennes University was incorporated and designated as the recipient of the land granted by congress. In 1830 and subsequently the legislature assumed the right to sell and rent the lands and appropriate the receipts for state purposes. The resources of the university were thus so crippled that it was forced to suspend work for a time; but in 1843 the trustees carried the matter into the courts, and finally by appeal to the Supreme Court of the United States obtained judgment in favor of the university. The state of Indiana has not yet fully paid the claims of the university, though a bill providing for payment was introduced in 1899, and a similar bill in 1901, and a commission was appointed in 1903 to report

on the subject of payment in 1905. The university includes the following departments: (1) The School of Literature and Science; (2) the Normal School; (3) the School of Music; (4) the School of Business. The School of Literature and Science consists of two departments, the College and the Academy, and offers a classical and a scientific course extending over five years, the first three years academic, the last two collegiate. No degrees are conferred. The work of the two years' collegiate course includes elective studies. The Normal School offers a teachers' elementary course of one year and a teachers' advanced course of two years. The School of Business is open during all the year and also holds night sessions; a business course, and a shorthand course are provided. One state scholarship for each legislative district is provided. The library contains over 6,000 volumes; the students number 232.

VINCENT, *vĭn'sĕnt*, BOYD, S.T.D.: American Protestant Episcopal bishop: b. Erie, Pa., 1845, May 18. He was graduated from Yale in 1867 and from the Berkeley Divinity School, Middletown, Conn., in 1871. He took orders in the ministry in the last named year, was assistant at Saint Paul's, Erie, 1871-2, rector of Cross and Crown Church, Erie, 1872-4, and rector of Calvary Church, Pittsburg, 1874-89. In 1889 he was consecrated bishop coadjutor of southern Ohio.

VINCENT, CHARLES EDWARD HOWARD: English soldier and member of parliament: b. Slinfold, Sussex, 1849, May 31. Educated at Westminster School and the Military College at Sandhurst, he served in the army 1868-73, was called to the bar of the Inner Temple in 1876 and was military commissioner of the London *Daily Telegraph* at the opening of the Russo-Turkish war in 1877. In 1878 he reorganized the metropolitan detective system, and has sat in parliament as a conservative member for Sheffield since 1885. He has published *Russia's Advance Eastward* (1872); *Military Geography* (1873); *Law of Criticism and Libel* (1877); *Law of Extradition* (1880); *Howard Vincent Map of British Empire* (10th ed., 1902); *Police Code and Manual of Criminal Law* (11th ed., 1901); etc.

VINCENT, FRANK: American traveler: b. Brooklyn, N. Y., 1848, Apr. 2. He was educated at Yale and for many years devoted himself to a systematic tour of the world. In 1884 he gave to the New York Metropolitan Museum of Art an extensive collection of Indo-Chinese antiquities and art. His published works include *The Land of the White Elephant* (1874); *Through and Through the Tropics* (1876); *Norsk, Lapp, and Finn* (1881); *Around and About South America* (1890); *In and Out of Central America* (1891); *Actual Africa* (1895); etc.

VINCENT, JOHN HEYL, S.T.D., LL.D.: American Meth-

odist bishop: b. Tuscaloosa, Ala., 1832, Feb. 23. He was educated at the Wesleyan Institute, Newark, N. J., engaged in preaching at 18, and in 1857 was ordained elder. In 1857-65 he was pastor at Galena, Ill., and at Chicago. He founded the *Sunday-School Quarterly* in 1865, and the *Sunday-School Teacher* in 1866, embodying in them the Sunday School lesson-system since widely adopted. In 1874 he established, in conjunction with Louis Miller, the Chautauqua Assembly, of which he was chancellor 1878-1900. He was elected bishop in 1888, residing at Topeka, Kan., until 1900, when he became resident bishop in charge of the European work of the Methodist Episcopal Church. In addition to various text-books published for the use of the Chautauqua Society, he has written: *Little Footprints in Bible Lands* (1861); *The Modern Sunday-School* (1887); *Unto Him* (1899); etc.

VINCENT, Leon Henry, A.B.: American author and lecturer: b. Chicago, 1859, Jan. 1. He was graduated from Syracuse University, and since 1885 has given his time mainly to lecturing upon English and American literature. He has published *The Bibliotaph and Other People* (1898); *Hotel de Rambouillet and the Précieuses* (1900); *The French Academy* (1901); *Corneille* (1901); *Molière* (1902); *American Literary Masters* (1906); etc.

VINCENT, Marvin Richardson: American Presbyterian clergyman: b. Poughkeepsie, N. Y., 1834, Sept. 11. He was graduated at Columbia in 1854; was classical instructor in the Columbia grammar school 1854-8, and professor of languages in the Methodist University of Troy, N. Y., 1858-60. In the year last named he entered the Methodist ministry, but three years later became a Presbyterian and was successively pastor of the First Presbyterian Church of Troy 1863-73, and of the Church of the Covenant, New York, 1873-88. Since 1888 he has been professor of New Testament criticism at Union Theological Seminary, New York. With C. T. Lewis, he translated Bengel's *Gnomon of the New Testament* (1860-2). He is the author of *Amusement a Force in Christian Training* (1867); *The Two Prodigals* (1876); *Gates into the Psalm Country*, a series of descriptions (1878); *Stranger and Guest* (1879); *Faith and Character* (1880); *The Minister's Handbook* (1882); *Christ as a Teacher* (1886); *Word Studies in the New Testament* (1887-1900); *That Monster, the Higher Critic* (1894); *The Age of Hildebrand* (1896); *A History of the Textual Criticism of the New Testament* (1899); etc.

VINCENT, *văng-sŏng'*, of Beauvais, *bō-vā'*, or Vincen'tius Bellovacen'sis: mediæval scholar: b. Beauvais (Bellovacum), France; d. about 1264. He was a Dominican friar, and at the instance of King Louis IX., of whose sons he was tutor, wrote a sort of encyclopedia, *Bibliotheca Mundi*, or *Speculum Quadruplex*, in which is found a good review of the state of philosophy, theology,

science, art, economics, etc., in that age. He was author of several other works, a partial collection of which was printed at Basel 1481. See *Vincentius von Beauvais*, by Schlosser (Frankfurt, 1819); *Etudes sur Vincent de Beauvais*, by Bourgeat (Paris, 1856).

VINCENT, *văng-sŏng'*, OF LÉRINS, *lĕh-răng'*, SAINT: mediæval theologian: 5th c. He was a monk and priest in a monastery on the island of Lerina, now St. Honorat, one of the Lérins (q.v.) Islands, in the Mediterranean, off Antibes, France—hence his surname *Lerinensis*. Vincent was a pupil of Cassianus. He appears to have adopted some of the tenets of Semi-Pelagianism. In his one work, *Commonitorium pro Catholicæ Fidei Antiquitate et Universitate*, he first formulated the theory of catholic tradition in the celebrated phrase *quod semper quod ubique, quod ab omnibus*, etc. To Vincent some writers have credited the authorship of the creed *Quicumque vult salvus esse*, commonly designated the Athanasian creed: other authors of the same age to whom that *symbolum* has been attributed are Hilary, Bishop of Arles, and Vigilius of Thapsus.

VIN'CENT, ST.: British island of the West Indies. See ST. VINCENT.

VIN'CENT, ST., Earl of. See JERVIS, JOHN.

VIN'CENT, ST., CAPE. See ST. VINCENT, CAPE.

VINCENT, *vĭn'sĕnt* (or VINCENTIUS, *vĭn-sĕn'shĭ-ŭs*), SAINT: Christian martyr: d. about 303. He was archdeacon of Saragossa in Spain, and in the persecution of Diocletian was put to death for the Christian faith at Valencia. The narrative of his martyrdom, called *Passio Sancti Vincentii* (in *Acta Sanctorum* under date Jan. 12), is very ancient, being quoted by Augustine, Prudentius, Paulinus Nolanus, Venantius Fortunatus, and Gregorius Turonensis. It is full of almost incredible details of tortures and miracles.

VINCEN'TIAN CONGREGATION: named from its founder, the Roman Catholic saint, Vincent de Paul; an association of secular priests, who, though not forming in the strict sense a religious order, are bound by vows, and are especially devoted to the duty of preaching and hearing confessions among the people, particularly the poor. Another object of the Vincentian Congregation is the direction of episcopal seminaries and other colleges for education of ecclesiastics, as also to direct the annual devotional exercises of the secular clergy, called Ecclesiastical Retreat: see PAUL, VINCENT DE (SAINT). At a somewhat recent enumeration the Vincentian Congregation numbered more than 700 members, in France, Italy, Poland, the Levant, and Algeria. The members are numerous also in the United States, and branches exist in Ireland and Scotland. The name Vincentian is given sometimes also to the sisterhoods (of which there are several, and of which that of Charity is the most

remarkable), which were founded by Vincent de Paul, and even to the Charitable Lay Association, better known as the Society of St. Vincent de Paul, which has extensive ramifications in almost all the countries in communion with the Church of Rome, and which has been the occasion of some restrictive measures in France. See BROTHERS AND SISTERS OF CHARITY; PAUL, VINCENT DE (SAINT).

VIN'CENT OF PAUL, SAINT. See PAUL, VINCENT DE (SAINT).

VINCI. See LEONARDO DA VINCI.

VINCIBLE, a. *vĭn'sĭ-bl* [L. *vincĭbĭlis,* that can be conquered—from *vinco,* I conquer]: that may be overcome or subdued. VIN'CIBIL'ITY, n. *-bĭl'ĭ-tĭ.* VIN'CIBLENESS, n. *-bl-nĕs,* the state or quality of being vincible.

VINCULUM, n. *vĭng'kū-lŭm* [L. *vincŭlum,* a band—from *vincĭō,* I bind]: *literally,* any band or fetter; in *alg.,* a bar or line placed over several quantities in order to connect them together as one quantity, as $\overline{a+b} \times c$.

VINDELICIA, *vĭn-dē-lĭsh'ĭ-â:* in the later Roman empire, a province bounded by the Danube and the Inn, and by Rhœtia and Helvetia. The capital Augusta of the Vindelici (*Augusta Vindelicorum*), is the modern town of Augsburg.

VINDH'YA MOUNTAINS. See INDIA.

VINDICATE, v. *vĭn'dĭ-kāt* [L. *vindĭcātus,* pp. of *vindicārĕ,* to claim, avenge—from *vindex* or *vindĭcem,* a claimant]: to justify; to maintain as true and correct against denial, censure, objection, or accusation; to assert; to prove to be just; to defend with arms; to claim; in *OE.,* to avenge. VIN'DICATING, imp. VIN'DICATED, pp. VIN'DICATOR, n. *-kā-ter,* one who vindicates. VIN'DICA'TION, n. *-kā'shŭn,* the defense of anything; a justification against denial, censure, objection, or accusation; the proving of anything to be just. VIN'DICATIVE, a. *-kā-tĭv,* tending to vindicate; in *OE.,* vindictive. VIN'DICA'TORY, a. *-kā'tėr-ĭ,* tending to vindicate; inflicting punishment; avenging. VIN'DICABLE, a. *vĭn'dĭ-kă-bl,* that can be vindicated or justified. VINDICTIVE, a. *vĭn-dĭk'tĭv,* given to revenge; prompted by revenge. VINDIC'TIVELY, ad. *-lĭ,* by way of revenge. VINDIC'TIVENESS, n. *-nĕs,* the quality of being vindictive; revengeful temper. VINDIC'TIVE DAM'AGES, in *law,* damages awarded, not merely to compensate the plaintiff, but also to punish the defendant.

VINDICTIVE, VINDICTIVENESS. See under VINDICATE.

VINE, n. *vīn* [L. *vīnĕa,* a vine, a plantation of vines; *vīnum,* wine: Gr. *oinos:* Eng. *wine*]: the woody climbing plant that bears grapes (see below); the long slender stem of any plant that trails or climbs. VINED, a. *vīnd,* having leaves like the vine. VINER, n. *vīn'ėr,* in *OE.,* a

trimmer of vines. VINY, a. *vīn'ĭ*, abounding in vines; producing grapes. VIN'ERY, n. *-ėr-ĭ*, a vineyard; a hothouse in which vines are grown. VINE-DRESSER, one who dresses and cultivates vines. VINEYARD, n. *vĭn'yârd*, a plantation of vines producing grapes. VINIC, a. *vĭn'ĭk*, pertaining to, characteristic of, or derived from wine, as *vinic* acid, a *vinic* flavor. VINOUS, a. *vīn'ŭs* [L. *vīnōsus*]: belonging to or producing wine; having the qualities of wine; also VINOSE, a. *vī'nōs*. VINOS'ITY, n. *-nŏs'ĭ-tĭ*, the state or quality of being vinous. VINTAGE, n. *vĭn'tāj* [F. *vendange*, vintage—from L. *vindēmĭa*]: the yearly crop or produce of the grape; the time of gathering the grapes; the wine produced from the grapes of one season. VIN'TAGER, n. *-tā-jėr*, one who gathers the vine. VINTNER, n. *vĭnt'nėr* [OF. *vinetier*—from *vin*, wine]: one who sells wine. VINE-CLAD, a. covered with vines. VINE-DISEASE, a disease of the vine, proceeding either from an insect or from a parasitic fungus.

VINE: any climbing plant, especially if shrubby, as the hop-*vine*, the *vines* of melons; but particularly a plant of the genus *Vitis*, nat. order *Vitaceæ*, having *pentamerous* flowers (5-toothed calyx, 5 petals, 5 stamens), and the petals united into a kind of hood, and deciduous. The most important species is the GRAPE-VINE (*V. vinifera*), from the fruit of which wine and raisins are made. Until the ravages of the phylloxera made it important to secure a more vigorous stock, this was the only species planted, to any extent, in Europe. Owing either to inherent weakness of the plant or to lack of suitable climatic conditions, varieties of this species do not thrive in the United States except in California and possibly a limited area in the south.

The grape-vine has large, angular, lobed, toothed, and more or less hairy leaves. The stems are numerous and branching, very long, and of rapid growth, with many tumid joints, the outer bark readily splitting and peeling off, the woody tissue abounding with vessels of large size, from which, at the seasons of active vegetation, if the branch is wounded or cut across, the sap pours in prodigious quantity. The fruit-stalks, much branched, are opposite to the upper leaves, or in their stead are tendrils. The flowers are small, greenish white, and fragrant. The fruit is a round or oval berry, 2-celled and 4-seeded, varying much in size and color—in the small Corinth or Currant Grape, about $\frac{1}{4}$ of an inch in diameter; in the largest varieties, more than half an inch; green, yellow, red, purple, and sometimes variegated; but the color is entirely in the outer skin, the juice being always colorless; and while the pulp of the grape is wholesome, nutritious, and gently laxative, the skin is astringent and indigestible. Some of the ovules are often abortive, or even all of them in the fruit of old vines of some varieties, e.g., the seedless Ascalon or Sultana raisins.

The vine attains large size, the stem being sometimes 18 inches in diameter (a vine in California is said to have a diameter of 36 inches), so that the wood, which is very hard and durable, has been used for making furniture, statues, etc. It attains very great age, continuing fruitful for at least 300 or 400 years.

The grape is one of the most valuable of fruits, not only for its use in the manufacture of wine, and as the source from which brandy, vinegar, and tartaric acid are obtained, but also because, both in a fresh and dried state, it forms not a mere article of luxury, but a great part of the food of the inhabitants of some countries. Dried grapes, under the names *raisins* and *currants*, are a considerable article of commerce. Fresh grapes are commonly eaten with bread in Syria, and some other countries in which they abound. The usefulness of some varieties of the grape is increased by its ability to keep fresh for many weeks if stored in a cool airy place. The number of varieties described in works on the culture of the grape and in the catalogues of nurserymen is already among the thousands; and many new kinds, obtained from seed and by hybridization, are introduced every year. Under the name *Ampelography* [Gr. *ampelos*, a vine], this subject has been elevated by German writers almost to the rank of a science.

It is doubted of what country the grape-vine is a native, nor is it known at what time—certainly very remote—its cultivation was first introduced into s. Europe. It is now found wild in parts of Europe, but is rather naturalized than truly native. It seems probable that it is indigenous in the hilly countries south of the Caspian sea, where it is very abundant and luxuriant, climbing to the tops of the loftiest trees, and producing large bunches of delicious fruit.

The cultivation of the grape and the making of wine are of most remote antiquity, as appears from the Scripture history of Noah, and from many passages of the most ancient authors. The mythological fable of the marches of Bacchus relates to the extension of the culture of the vine from Asia into Europe. The earliest records of the manner of cultivating the vine are by the Roman authors Virgil and Columella. The vine was introduced into s. France probably as early as into Italy; it is said to have been brought to Marseille by the Phocæans, about B.C. 600, and its cultivation was early coextensive with civilization in all the countries near the Mediterranean. In Italy, so much of the land was occupied by vineyards that Emperor Domitian, fearing a scarcity of corn, issued a restrictive or prohibitory edict, A.D. 81, which continued long in force, through fear that the abundance of fine wine might tempt the barbarians of the north to invade the country. The vine was introduced into s. Germany about B.C. 3d c. Augustus preferred the Rhætian wine to all other. The first vineyards on the Rhine and Moselle were planted by the Emperor

Probus A.D. 281. Under the Merovingians, the culture of the vine extended greatly in France and Germany. Charlemagne derived considerable revenue from the vineyards even of the n. parts of his empire. The Huns who remained in a number of settlements on the Rhine, after the expedition of Attila into Gaul, 451, brought thither from Pannonia the arts of cultivating the grape, and of making wine; and Hunnish grapes and Hunnish wine were long in high repute. In the middle ages, the monks were the first to plant vineyards and to make wine, in many parts of Europe.

The cultivation of the vine was introduced into England by the Romans. At the time of the Norman conquest there seem to have been vineyards in s. and s.w. England, and though they afterward disappeared, successful attempts were occasionally made to re-establish them; and one at Arundel Castle in Sussex yielded, about the middle of the 18th c., large quantities of wine. Of late years, the cultivation of the vine has much increased in s. England, in gardens, on the walls of suburban villas and of cottages, but chiefly for the fresh fruit, though wine of moderately good quality is made in small quantities for domestic use.

The vine is a hardy plant, so far as endurance of severe winter-frosts is concerned; but it requires for the ripening of its wood, as well as of its fruit, a considerable summer-heat continued for several months. A very moist climate is unsuitable to it. It produces abundant fruit in warm climates, such as India; but the juice passes too rapidly into acetous fermentation to be used for making wine.

In Europe the cultivation of the vine forms an important branch of rural economy as far n. as Coblenz on the Rhine; but in some countries, particularly Greece and the Ionian Islands, raisins are the chief part of the produce of the vineyards.

The cultivation of the vine was early introduced by the Spanish and Portuguese into the Azores, the Madeira and Canary Isles, and America. The first vines were carried to the Cape of Good Hope by the Dutch 1650; but while the wines of Madeira and those of the limited district of Constantia at the Cape of Good Hope have long had high celebrity, and those of Canary and Teneriffe have been imported in considerable quantities into Europe, it is only of late that much attention has been given to cultivation of the grape in the other parts of Cape Colony.

The early settlers of the n. portion of the United States found grapes growing wild, but for a long time little attention was given to their cultivation. From about 1620 in Virginia and 1683 in Pennsylvania, many efforts, which resulted in failure, were made to grow European varieties; but about 1771 the cultivation of these sorts was successfully established on the Pacific coast. With two exceptions the American varieties now

under cultivation have been originated since 1820; and as late as 1850 there were only 6 or 8 varieties supposed suitable for general cultivation. The first marked success was with the Catawba, which came into notice about 1835, and which, though lacking in hardiness, was extensively planted. Nearly all the varieties now grown have been originated since 1860.

Besides *V. vinifera*, produced in California, the species of grapes grown in the United States are as follows: *V. labrusca*, the n. Fox grape, native of the Alleghany Mountain region, and found from Canada to South Carolina—the source of more cultivated varieties than any other native species; among these are the Catawba, Concord, Hartford Prolific, and other popular sorts: the foxy flavor of the original largely disappears when varieties are brought under cultivation; *V. riparia* (with which *V. cordifolia* is often confounded), the Frost grape, from which we have the Elvira, Clinton, and Taylor; *V. æstivalis*, the Summer grape, from which have come the Cynthiana, Herbemont, and Norton's Virginia; *V. labrusca*, the n. Fox grape, native of the Alleghany grape and Sugar grape; *V. vulpina*, or *rotundifolia*, the s. Fox grape, from which have come the several varieties of the Scuppernong. A large number of hybrid varieties, many of great value, have been originated. Some varieties succeed over a large area and under widely differing conditions of soil and climate; but many sorts valuable in certain circumscribed localities do not thrive elsewhere. There is, however, little difficulty in finding kinds of good quality and a sufficient degree of hardiness for any portion of the United States. The following are among the most popular varieties: *Black Grapes*—Concord, Hartford Prolific, Moore's Early, Wilder, and Worden; *Red Grapes*—Agawam, Brighton, Catawba, Delaware, Salem, and Vergennes; *White Grapes*—Diamond, Lady, Martha, and Niagara; *Foreign Grapes*—Black Hamburg, Flaming Tokay, and White Frontignan.

As seedings do not reproduce the parent variety, but often differ widely from it, they are grown only to procure new sorts or to obtain hardy stocks on which to graft the more delicate European kinds. Propagation is effected by cleft-grafting (see GRAFTING), layers, or cuttings. Grafting is to be done just before cold weather sets in, and at a few inches below the surface of the ground. The soil is to be pressed around the graft to its upper bud, and a small inverted flower-pot placed over it so that the scion may not be loosened when the soil, which must be piled around and upon it in sufficient quantities to prevent freezing, is removed in the spring. This method often fails, but when successful it secures vigorous growth and very early fruitage. It is valuable particularly for testing any sorts and for utilizing strong bearing vines which yield a poor quality of fruit. In Europe whip-grafting of varieties of *V. vinifera* upon

roots or cuttings of American sorts—principally varieties of *V. riparia*, which are not liable to injury by the phylloxera (see PHYLLOXERA)—is very extensively practiced. In this country large quantities of vines are grown from layers. In spring the cane from which plants are to be grown is fastened to the bottom of a trench six in. deep. A new plant soon springs from each bud. When these plants have made a growth of 8 to 10 in. the trench is carefully filled with soil. In the autumn the cane is cut between the shoots, and the latter can be transplanted. Somewhat inferior plants can be obtained by laying down, in July, shoots of the same season's growth, and covering at once with soil. The most common method of propagation of the vine is by cuttings. These are made, in the fall, from well-ripened wood of one season's growth, cut into pieces 6 to 8 in. long (each having 2 or 3 buds), cut off smoothly close to the lower bud, and 1 in. above the upper one. In the spring these cuttings are planted, 3 in. apart, in a trench with a sloping side against which they are placed. The soil must be firmly packed in the lower portion of the trench, which is then to be filled more loosely as high as the upper bud of the cutting, which should be a little below the surface of the ground. After the shoots are a few inches high the trench is to be completely filled. The Delaware, and a few other varieties, will not grow well in this way, but can be started from cuttings only 2 or 3 in. long, each having but one bud. These cuttings are rooted in sand by the aid of artificial heat.

Though the vine will grow in a great variety of soils it thrives best in soil rather light and dry. A granite or limestone formation is desirable; and gently-sloping hillsides, especially if they face the s. or s.w., are more favorable than valleys or level fields. In a wet location the land should be thoroughly underdrained. Deep plowing is essential, and subsoiling is desirable. Moderate quantities of well-rotted stable manure should be incorporated with the soil, and ground bones and fertilizers rich in potash will tend to promote vigorous and healthy growth of the vines. Planting may be either in spring or in fall. For the fruit-garden many growers prefer vines two years old, but where planting is on an extensive scale those one year old are considered best. The distance apart of the vines varies with the character of the variety, from 6x8 ft. for the small growing sorts to 10x10 ft. for the more vigorous kinds. At the time of planting the tops of the vines should be cut back to 2 or 3 buds, and it is often desirable to shorten the roots. Planting should be carefully done, and during the first two seasons low growing crops, e.g., beans or potatoes, may be grown between the rows; but fertilizers must be liberally used or the other plants will retard the growth of the vines. Whether any other crop is grown or not, sufficient cultivation must be given to keep the soil mel-

low and prevent growth of weeds and grass. In the fall of the first year the top of the vine should be cut to a single cane with 3 buds. The second season, this cane should be tied to a stake 4 ft. high, the lateral shoots pinched off when about 5 in. long, also the end of the vine when the top of the stake is reached. The third season, a trellis upon which the vines can be trained is requisite: this may be made of posts, reaching 6 ft. above ground, 20 ft. apart, on which are fastened 4 lines of galvanized wire. The fruit borne this season will be on branches from the main stem; but in later years the laterals must be cut back to 3 buds, after the leaves have fallen in autumn, from which will grow the new wood on which fruit will be borne the next season. Summer pruning consists in pinching back the young shoots on which fruit has started, but which are not intended for bearing canes the next year. This must not be overdone, as it is important to leave foliage enough to shade the fruit and fully to elaborate the sap. If the vine shows tendency to overbear, the fruit should be thinned when it is quite small, care being taken to remove the smallest and most imperfect clusters. Girdling the vine consists in removing from the bearing canes, near the base, a ring of bark $\frac{3}{16}$ in. to $\frac{3}{8}$ in. wide. It is done, at the north, early in July, and hastens the ripening of the fruit about 10 days. The fruit is rendered somewhat softer, and seems more liable to crack; but the size is considerably increased and the flavor is fully maintained. It is to be practiced only on canes which are to be removed the next season. If the best quality is to be secured, the fruit must remain on the vine till it is fully ripe. When the fruit is gathered, the stems should be cut rather than broken. Only the varieties with thick skins can be safely sent to distant markets, and shipments ought always to be in baskets or boxes of thoroughly seasoned wood. In cold regions it is necessary to give the vine protection during the winter. Some varieties require less than others, but where the cold is severe it is well to at least lay the vines on the ground at the approach of winter. Evergreen boughs are useful for covering. Where these cannot be had, 2 or 3 in. of soil may be thrown over the tops. Gravel or sand answers better for covering than clay or other compact soils.

The principal diseases of the American vine are mildew and black-rot. The causes of mildew are supposed to be certain peculiar conditions of the atmosphere, neglect of pruning, lack of mineral elements in the soil, and lack of constitutional vigor of the plant. Dusting the affected foliage every two weeks with flowers of sulphur, when the leaves are wet, is a common remedy. To prevent black-rot the leaves may be sprayed every 10 days, during the growing season, with the Bordeaux mixture as used for preventing the potato-rot (see POTATO-ROT). A preventive of both mildew and black-

rot, which is rapidly growing in favor, is the use of paper bags, which are put over the clusters when the fruit is quite small, and fastened around the stems with common pins: the 2-lb. size is generally used. This method is useful also in preventing injury to the fruit by bees and other insects. See OIDIUM—*Oidium Tuckeri.* The chief enemy of the European vine-grower is the Phylloxera (q.v.), which has caused immense losses. The remedies consist in submerging the ground with water 7 or 8 weeks each winter, or the application of chemical insecticides, e.g., sulphocarbonate of potassium, or bisulphide of carbon, in sufficient quantities to reach the infested roots; but these are far too costly for general use. Preventive measures are the planting in soil containing 60 per cent. of sand (an expensive method which can be employed in but few localities), and the grafting of the European varieties on hardy American sorts. The principal enemy of the vine-grower in this country is the rose-bug, which often proves very destructive by eating the flowers. Hand-picking and dusting with pyrethrum powder are the leading remedies.

The juice of ripe grapes contains considerable *grape-sugar* (see SUGAR), small quantities of a glutinous substance, and of extractive, bitartrate of potash, tartrate of lime, a little malic acid, and other ingredients, suspended or dissolved in water. The rapidity with which it passes into a state of fermentation after being expressed from the fruit, is remarkable.

For grape-culture in the United States, see VITICULTURE: for the making of wine, the wine-trade, the qualities and uses of wine, the different kinds of wine, etc., see WINE. Concerning the other commercial products of the grape, see BRANDY; VINEGAR; TARTARIC ACID; RAISINS; CURRANT.

VINEGAR, n. *vĭn'ĕ-gẽr* [F. *vinaigre*—from *vin,* wine; *aigre,* sour—from L. *vinum,* wine; *acer,* sour]: an acid liquor obtained from wine, cider, beer, and the like, by the acetous fermentation; the form of *Acetic Acid* (q.v.) which is generally preferred for culinary purposes; anything really or metaphorically sour: V. to pour vinegar on; to render sour or acid. AROMATIC VINEGAR, strong acetic acid highly flavored with aromatic substances. VIN'EGARETTE', n. *-ĕt,* another spelling of VINAIGRETTE (q.v.)—*Vinegar* is a dilute form of Acetic Acid (q.v.) largely manufactured in Great Britain by the fermentation of malt; on the continent of Europe, from low wines which have turned sour; and in the United States from cider. *Malt vinegar,* or, as it is sometimes called, 'British vinegar,' is made by brewing a weak wort from malt exactly as for Beer (q.v.). To 100 gallons of this, at a temperature of 70°, are added 4 gallons of yeast, and well stirred through for 8 or 10 minutes. This mixture is allowed to ferment actively for two days, and is then transferred to the stoving-room; here it is dis-

tributed into a number of tubs, which, when filled, are covered with coarse canvas. This room is dark, and is heated by stoves, and the heat is constantly sustained for weeks until the conversion of the wort into vinegar is complete. The process of acetification is accelerated by introducing into the casks with the wort either the residuary fruit used in making domestic wine, or the footstalks and skins of grapes: this *rape*, as it is called, acts as a kind of ferment. The processes in use vary somewhat in details. Much vinegar is made also of beer which has become sour; but it is inferior in quality, and lacks the agreeable flavor of malt vinegar prepared by the above process, which is due to the presence of acetic and other ethers.

An insipid kind of vinegar is made by means of the Vinegar-plant (q.v.). The vinegar-plant itself may be produced thus: a solution of a quarter lb. of sugar and a half lb. of molasses in three quarts of water is first simmered, then poured into a jar, covered, and kept in a warm place for six weeks. The liquid becomes vinegar, and on the top there has been formed a scum-like fungus, which is the vinegar-plant; and by adding a piece of this to a similar solution, the conversion into vinegar proceeds in much less time. During the process, the plant thickens by formation of a new layer on its under surface; and by peeling off this layer, and using it in a fresh operation, the plant may be propagated indefinitely.

The greatest manufacture of *wine-vinegar* in Europe is at Orleans, France. Here the wines are sent from all parts when unfit for drinking, and are converted into vinegar. In the manufacture, a large number of casks are used, with openings into each of only two inches diameter. Into each one are poured 100 pints of vinegar boiling hot; and to this, after eight days, are added 10 pints of sour wine, and this is repeated every 8 days until the cask is full; another 15 days completes the process, and the vinegar is ready for use. Beech-shavings are much used in vinegar-making, as they are found to assist in clarifying the liquor by attracting the lees, which settle on them, and leave the liquor clear, in which state it acetifies more rapidly.

According to Ure, a good vinegar may be prepared by adding to each gallon of a syrup composed of $1\frac{1}{4}$ lb. of sugar and 1 gallon of water a quarter of a pint of yeast. If kept three days at a temperature of 75° or 80°, it will be sufficiently acidified to allow of being drawn off into the refining-cask, where one ounce of bruised raisins and one ounce of crude tartar are to be added to each gallon of liquor. When the sweet taste has quite disappeared it should be drawn off into bottles, and corked down tightly. It is stated that such vinegar will contain 5 per cent. of pure acetic acid. Vinegar prepared by these methods contains a large amount of foreign matter, which can be discharged by simple distillation; the acid

liquid which comes over constituting what is known in pharmacy as *distilled vinegar*. What is sold commercially as distilled vinegar is simply acetic acid distilled from wood (see PYROLIGENEOUS ACID), and diluted with five times its volume of water. This constitutes also the vinegar used by pickle manufacturers; it is as wholesome as common vinegar, but lacks its agreeable flavor; its preservative powers are much greater, and its cost very much less. Vinegar containing 5 per cent. of the pure acid is the strongest that is ever produced, and is termed *proof vinegar*. There are four kinds manufactured, known in trade by the numbers 18, 20, 22, and 24, the last being the best quality. The strength of any specimen is best ascertained by determining the quantity of anhydrous carbonate of soda which a given weight of it will neutralize, it being recollected that 100 grains of carbonate of soda correspond to 96.2 grains of anhydrous acid. The ammonia test, according to Neligan, serves to distinguish French from English vinegar: with the French, the color is purplish; with the English, there is either no change, or it is brownish. There is generally a slight turbidity, due to a trace of lime.

As a condiment, vinegar is an ingredient of a large number of sauces, and all ketchups and pickles; and though not an essential article of food, its applications in cookery are numberless. Properly used, it is healthful; but to drink vinegar freely with the view of reducing corpulency is to run the risk of exchanging slight fulness of habit for chronic dyspepsia.

Vinegar is used in medicine as a cooling astringent; and is beneficial—taken freely in large dilution with water—in hæmoptysis, in hæmatemesis, and in the colliquative sweating of hectic fever. In severe hiccough, it is said that relief is often given by a dose of a wineglassful of vinegar. In cases of poisoning with the alkalies or their carbonates, it is one of the best antidotes. It may be applied also locally in various ways —e.g., to check hemorrhage from the nose, womb, etc. In intestinal hemorrhage, an enema containing vinegar and cold water may be used with success, especially if the lower part of the intestine be the seat of the bleeding. Sponged in a diluted state (one part to three of cold or tepid water) over the neck, chest, etc., it affords comfort and relief in cases of colliquative sweating. In its character of a refrigerant rather than as an astringent, its local action on the skin is beneficial (tranquilizing and often sleep-inducing) in treatment of most febrile and inflammatory diseases; it should be freely applied, as in colliquative sweats, to the surface of the body, face, and extremities. The heat and pain commonly experienced in sprains are often relieved by local application of brown paper soaked in diluted vinegar, and changed when the feeling of heat returns. It is an important addition to astringent gargles in cases of re-

laxed uvula and tonsils; and is the best application to the eyes when lime has got within the eyelids. The ordinary dose is from 2 to 4 drams; and when taken as a drink, 3 ounces may be mixed with a pint and a half of water, and taken in the course of the day.

The term *Chili vinegar* is applied to a preparation obtained by infusing half an ounce of cayenne pepper in a quart of French vinegar for ten days, and straining: it is often added to gargles in the proportion of 1 ounce to 8 or 9 ounces of infusion of roses, in cases of relaxed sore throat.

Aromatic Vinegar, known also as *Vinegar of the Four Thieves, Marseille Vinegar*, and *Camphorated Acetic Acid*, consists of strong acetic acid, holding in solution camphor and the oil of cloves, lavender, rosemary, and lemons: it is very fragrant and volatile, and must be kept in well-stoppered bottles. It was formerly regarded as a valuable prophylactic of all infectious diseases, but is now used only as an external stimulant, the vapor being applied by a smelling-bottle to the nostrils in cases of fainting.

VIN'EGAR BI'BLE: a Bible printed at the Clarendon Press, Oxford, England, 1717; named from a printer's error in the running head-line of Luke xxii., in which the word 'vineyard' was printed *vinegar*.

VINEGAR HILL, Ireland: an elevation 389 ft. high, close to the town of Enniscorthy, in County Wexford, scene of the defeat of the Irish by General Lake, 1798, June 21. The Irish had camped here for about a month, and discredited their cause by outrages on the lives and property of the loyalists in the surrounding country. About 400 of the Irish were cut down; the remainder fled to Wexford, whither Lake marched the day after, killing all whom he found with arms.

VINE'LAND: borough in Cumberland co., N. J.; on the Philadelphia & Reading railroad; 35 m. s. of Philadelphia. It is in a fruit-growing and farming region; contains numerous churches, high school, several graded schools, public library, public halls, water, gas, and electric light plants; daily, weekly publications; a national bank, a state bank; and has manufactories of shoes, shirts, agricultural implements, foundry products, buttons, gloves and paper boxes. Vineland was founded by Charles K. Landis 1861, and has from the first been governed on strict temperance principles. The mildness of the climate in winter has attracted residents in a sanitary point of view.—Pop. (1910) 5,282.

VINES, *vīnz*, RICHARD: physician and colonist: about 1585-1651, Apr. 19; b. Bideford, Devonshire, England. In 1609, he was sent by Sir Ferdinando Gorges to Maine to explore the country and form a settlement. The settlement was made 1616-7 near the mouth of the Saco river, and the same year Vines ascended the river in a

canoe as far as Crawford's Notch. He was the first white man to describe the White Mountains. Saco and Biddeford were founded by him and John Oldham, on land granted them by the Plymouth Company. He died at Barbadoes.

VINET, *ve-nā'* ALEXANDRE-RODOLPHE: Swiss divine, and critic of French literature: 1797, June 17—1847, May 15; b. Lausanne. He received his education in his native city, and was ordained a minister of the Prot. Church 1819. From an early age, he showed a fondness for the study of French literature; and at the age of 20 he was appointed prof. of French language and literature in the gymnasium of Basel. This position he held till 1837, when he removed to Lausanne, to fill the chair of practical theol. in the acad. of that city. This, however, he resigned 1840, when he seceded from the national church, on account of the new constitution imposed upon it in that year. He appears, however, to have continued his lectures; and in 1844 again connected himself with that institution as substitute-prof. of French literature. Vinet was a leader in forming a constitution for the Free Church of Vaud, organized by seceders from the national church 1845—a secession due largely to the influence of Vinet's writings and teachings in favor of the separation of church and state. Vinet was an eloquent and earnest preacher, clear and brilliant, rather than a profound theologian; strongly evangelical, yet advocating the utmost liberty and toleration of religious opinion and practice. He wrote largely on literature and on religion, and most of his works have been translated into English. His theol. treatises have much merit, though scarcely of the highest order; but his works on French literature show thorough acquaintance with its history, high critical power, appreciative faculty, and good literary judgment. As a philosophico-religious writer, he has been very popular among the educated religious public on both sides of the Atlantic. His principal works are: *Chrestomathie Française* (3 vols. 1829); *Histoire de la Littérature Française au XVIII. Siècle; Études sur la Littérature Française du XIX. Siècle*, 3 vols.; *Mémoire en Faveur de la Liberté des Cultes* (1826); *Discours sur quelques Sujets Religieux* (1831), and *Nouveaux Discours*, etc. (1841—selections from the two works last mentioned have been pub. in Eng. transl. under the title *Vital Christianity*); *Etudes sur Blaise Pascal, Etudes Evangéliques*, and *Nouvelles Etudes Evangéliques*, transl. into Eng. as *Gospel Studies;* etc.

VINEYARD SOUND, *vĭn'yĕrd:* strait or channel off the s.e. coast of Mass., separating the Elizabeth Islands from Martha's Vineyard. It is about 20 m. long, with average width 4 to 6 m. Vessels to and from Boston and southern ports usually pass through this sound.

VINGT-UN, n. *văngt'ŭng*, popularly *vān-tôn'* [F.

vingt, twenty; *un*, one]: a game at cards played with a full pack and by any number of persons, each player endeavoring to obtain cards to make up *twenty-one* points —whence the name.

VINIFACTEUR, n. *vĭn-ĭ-făk'tėr* [F.]: apparatus for collecting the alcoholic vapors that escape from liquids during the process of vinous fermentation.

VIN'LAND—i.e., *Wine'land:* name given to the chief settlement of the early Norwegians in N. America. There are good reasons for believing it to be represented in modern times by part of Mass. and R. I. The first who saw it was Bjarne Herjulfson, who was driven thither by a storm in the summer of 986, when making a voyage from Iceland to Greenland—his father, Herjulf, and Eric the Red being the earliest colonists of Greenland. But Bjarne did not touch the land, which was first visited by Leif the Lucky, a son of Eric the Red (q.v.), about 1000. The latter built a number of wooden houses, which were called *Leifsbúdir* (Leif's bothies?). A German named Tyrker, who accompanied him, noticed the grape growing there, as in his native country; hence Leif called the region 'Vinland.' Two years later Leif's brother, Thorwald, arrived, and in the summer of 1003 led an expedition along the coast of New England, southward, but was killed the year following in an encounter with the natives. The most famous of the Norwegian explorers, however, was Thorfinn Karlsefne, an Icelander, who had married Gudrid, widow of Thorstein, a son of Eric the Red, and who sailed 1007 from Greenland to Vinland with a crew of 160 men, remained three years, and then returned; after which no further attempts at colonization were made. Rafn (q.v.), in his *Antiquitates Americanæ*, has published the most complete collection of the evidence which proves the pre-Columbian colonization of America. See Wilhelmi's *Island, Hvitramannaland, Grönland und Vinland* (Heidelberg 1842). Both Rafn and Finn Magnusen are excessively anxious to show that Columbus derived his first hints of a new world from the accounts of these old Icelandic expeditions. Their *amor patriæ* perhaps leads them too far; yet it may be remembered that Finn Magnusen, in one of the early numbers of the *Nordisk Tidsskrift for Oldkyndighed*, established the fact that in 1477 Columbus visited Iceland, 15 years before he undertook his great expedition across the Atlantic; and he may have heard, while there, something of the long-abandoned Vinland. See MASSACHUSETTS—*History:* see also Nordenskiöld in *Nature*, XXVIII.; and the accounts of his expedition to Greenland 1883.

VINNITZA, *vĭn-nĭt'sâ:* town of w. Russia, prov. of Podolia; on both banks of the Bug; 137 m. e.n.e. of Kaminetz. It was founded in the 14th c., and has suffered much from the invasions of Tartars and Cossacks.

The district is fertile, and supplies material for distilleries. The merchants mostly are Jews.—Pop. 20,000.

VIN-ORDINAIRE, n. *văng-ŏr'dĭn-ār'* [F., common wine]: a kind of claret made and commonly used in France.

VINOUS, VINTAGE, VINTNER, etc. See under VINE.

VINQUISH, n. *vĭng'kwĭsh.* See VANQUISH 2.

VINTON, Iowa: city, county-seat of Benton county; on the Red River, and on the Burlington, Cedar Rapids & Northern railroad; about 30 m. s.e. of Waterloo and 22 m. n. of Cedar Rapids. It is in an agricultural and stock-raising region. The chief manufacturing establishments are a pearl-button factory, two corn-canning factories (about 1,000 employees during the corn-canning season), flour mill, and creameries. There are six churches. The educational institutions are the State College for the Blind, Tillford Academy, public schools, and a public library. The four banks have a combined capital of $240,000. The government is vested in a mayor and a council of eight members elected biennially.—Pop. 3,690.

VIN'TON, DAVID HAMMOND: soldier: 1803, May 4—1873, Feb. 21; b. Providence, R. I. Having graduated at West Point 1822, he was commissioned to an artillery regt., but was transferred to the infantry 1823; became chief quartermaster on the staff of Gen. Wool, with rank of major, 1846, and served through the Mexican war. He was chief quartermaster of the dept. of Texas 1857-61; and was made prisoner of war 1861, Feb., when Gen. Twiggs surrendered to the Confederates; was exchanged after 6 mos., and thereafter was deputy quartermaster-general of the army till 1866, when he was placed on the retired list. He was brevetted colonel and brigadier-general 1864 for 'faithful and meritorious services.'

VIN'TON, FRANCIS, D.D.: soldier and Prot. Episc. clergyman: 1809, Aug. 29—1872, Sept. 29; b. Providence, R. I.; bro. of David Hammond Vinton. On graduating at West Point, he was commissioned lieutenant of artillery 1830. He served against the Indians in Georgia and Alabama, receiving the thanks of congress and a land-grant in Indiana. While stationed at Boston, he studied law and was admitted to the bar 1834. He resigned his commission in the army 1836; studied theology; was ordained deacon 1838, priest 1839, in the Prot. Episc. Chh. He was rector in succession of churches in Providence, R. I., (1840-42), Newport, R. I. (1842-44), Brooklyn, N. Y. (1844-46), New York (1855-72). He declined election to the episcopate of Indiana 1848; was elected professor of ecclesiastical law and polity in the Gen. Theol. Sem., New York, 1869. He published *Arthur Tremaine, or Annals of Cadet Life; Oration on the Annals of R. I.; Commentary on the Gen-*

eral Canon Law.—Dr. Vinton was a man of unusual social gifts, and an impressive preacher.

VIN'TON, Francis Laurens: engineer: 1835, June 1—1879, Oct. 6; b. Fort Preble, Me.; cousin of David Hammond V. He graduated at West Point 1856, but the same year resigned from the army, and entered the School of Mines at Paris, where he graduated 1860. He was commissioned captain in the 16th U. S. infantry 1861; colonel of the 43d regiment N. Y. volunteers the same year, and served in the Peninsular campaign; was commissioned brigadier-general 1862, and commanded a brigade in the Maryland and Rappahannock campaigns. He was compelled, through disability from a wound, to resign from the army 1863, May 5. He was prof, of mining engineering in the School of Mines, Columbia College, 1864-77; also, after 1870, professor of civil engineering; thereafter till his death he was consulting engineer at Denver, Colo. Besides professional papers in technical journals, he was author of *The Guardian* (poem); *Theory of the Strength of Materials.*

VIOL, n. *vī'ŏl* [F. *viole;* It. *viola,* a fiddle or stringed instr.—from mid. L. *vitŭla,* a violin (see also Fiddle)]: the anc. form of violin, having from three to six strings, played with a bow, and not plucked, as the lute or guitar, which it resembled. Violist, n. *vī'ō-lĭst,* a player on the viol. Vi'olin, n. *-lĭn* [It. *violino*]: a musical instr. played with a bow and having four strings; a fiddle (see below). Vi'olinist, n. *-ĭst,* a player on a violin. Vi'oloncello, n. *vē'ō-lŏn-chĕl'lō* or *vī'ō-lŏn-sēl'lō* [dim. of It. *violone,* a bass violin]: a large instr. of the violin class, having four strings (see below). Vi'oloncel'list, n. *-lĭst,* player on the violoncello.—The *Viol* is no longer in use, having been superseded by the Violin (q.v.); but it is seen represented on monuments as far back as the close of the 11th c. The belly and back were flat; there were larger bends in the sides than in the violin; and frets, like those of the guitar, were placed on the neck of the instrument, to show where the fingers of the left hand should be placed to produce the desired notes. There was great variety in the number of strings: in Germany, three, four, and five were common; in Italy, six. The strings were tuned by fourths and thirds. Four sizes of viol were in use for treble, alto, tenor, and bass respectively; and they were often played together in concerted music. The smaller viols were called *viol da braccio,* from being held with the arm; the larger, *viol da gamba,* from being placed between the legs. The treble viol was rather larger than the modern violin. The viol da gamba, or bass viol, held its place longer than the smaller viols, but was eventually superseded by the Violoncello (q.v.).

VIOLA, n. *vī'ō-lă:* genus of plants to which the Violet (q.v.) belongs.

VIO'LA, or ALTO VIOLA, or TENOR VIOLIN: a large kind of violin, to which the part between the second violin and bass is generally assigned. It has four gut strings, the two lower covered with silvered copper wire. They are tuned by fifths, exactly an octave above the violoncello. The music is generally written on the alto clef.

VIOLABLE. See under VIOLATE.

VIOLACEÆ, *vī-ō-lā'sē-ē:* natural order of exogenous plants, of which about 300 species are known, natives of temperate and tropical countries, those belonging to the former generally herbaceous, and to the latter generally shrubby. They have simple leaves with persistent stipules. The calyx consists of five persistent sepals, usually elongated at the base; the corolla of five hypogynous petals, unequal in the sub-order *Violeæ*, and equal in the sub-order *Alsodeæ*. There are five stamens inserted in a hypogynous disk; the filaments prolonged beyond the anthers. The ovary is one-celled generally with many ovules; the style single, with an oblique stigma. The fruit is a three-valved capsule with many seeds. The best known species are the Violets (see VIOLET), prized for beauty and fragrance. Emetic and purgative properties prevail in the order; and some S. American species, particularly of the genus *Ionidium*, yield valuable medicines. The IPECACUANHA; CUICHUNCHUL. The leaves of the Lobolobo (*Conohoria* or *Alsodeia lobolobo*) are used in Brazil as spinach.

VIOLACEOUS. See under VIOLET.

VIO'LA DA GAM'BA: a bass viol held between the legs of the player (see VIOL); an organ-stop with metal pipe of narrow scale, and ears on the sides of the mouths, giving viol- or string-like quality.

VIOLA D'AMORE, *vī-ō'lâ dâ-mō'rā:* an instrument of the viol tribe, which had fallen into disuse, but was revived a few years ago with a degree of success by Urhan at Paris. It had five or seven strings of catgut, placed and played as in other bow-instruments; but below them, and passing underneath the bridge, were five or seven other strings of metal tuned in unison with them, which vibrated sympathetically when the former were played, giving to the music a peculiar resonant character. The compass was at least three octaves and a half. The strings of Urban's viola d'amore were tuned in thirds and fourths.

VIOLATE, v. *vī'ō-lāt* [L. *violātus*, pp. of *violārĕ*, to treat with violence—from *vis*, power: It. *violare:* F. *violer*]: to use force or strength against; to treat roughly or injuriously; to ravish; to disturb; to break; to transgress; to profane; in *OE.*, to injure; to hurt. VI'OLATING, imp. VI'OLATED, pp. VI'OLATOR, n. *-lā-tėr*, one who violates. VI'OLATIVE, a. *-lā-tĭv*, tending to desecrate or dishonor. VI'OLALLE, a. *-lă-bl*, that may be vio-

lated or injured. VI'OLABLY, ad. *-blĭ.* VI'OLA'TION, n. *-lā'shŭn,* the act of violating; interruption; transgression; outrage; profanation of sacred things; ravishment; rape. VI'OLENCE, n. *-lĕns,* [F.—L.]: highly excited force or action, moral or physical; vehemence; intensity; unjust strength applied to any purpose; injury done to what is entitled to respect; rape: V. in *OE.,* to use violence toward; to coerce by violence. VI'OLENT, a. *-lĕnt* [F.—L.]: urged or driven with force; produced or acting by force; outrageous; unnatural; severe; in OE., extorted: V. in *OE.,* to become violent. VI'OLENTLY, ad. *-lĭ.* TO DO VIOLENCE TO, to outrage; to force; to injure. —SYN. of 'violence, n.': force; attack; outrage; vehemence; injury; infringement; fierceness; turbulence; furiousness; impetuosity; oppression; passionateness; fury; severity; extremity.

VIOLENCE, VIOLENT. See under VIOLATE.

VIOLET, n. *vī'ō-lĕt* [F. *violette,* a violet, a dim. of OF. *viole*—from L. *viŏla,* the violet or wall-flower: It. *viola*]: a plant of the genus *Viola,* or one of its beautiful flowers (see below); one of the prismatic colors: ADJ. of a dark blue inclining to red; of the color of the sweet violet. VI'OLA'CEOUS, a. *-lā'shŭs,* violet-colored. VI'OLINE, n. *-lĭn,* a white poisonous principle obtained from the sweet violet. VIOLET POWDER, various perfumed preparations used in the nursery and for the skin.

VI'OLET: herbaceous plant of the genus *Viola,* nat. order *Violaceæ,* with short stem, or, if stemless, with short root-stock (rhizome); the leaves alternate, and having long stalks. The flowers have five petals, different in form and size, the lowest having a spur behind. Nearly 200 species of the genus *Viola* have been described, natives chiefly of n. temperate countries. Several species are much cultivated in gardens—some, e.g., *V. tricolor,* for their beautiful flowers; others, e.g., *V. odorata,* for their fragrance. *V. tricolor,* the PANSY, PANSY VIOLET, or HEART'S-EASE, is very abundant in fields, meadows, woods, etc., in most parts of Europe, and in n. Asia; and is cultivated in N. America. It is a very variable plant, its flowers differing much in size and color, but is readily distinguished by its large lyrato-pinnatifid stipules. The stem is somewhat triangular, branching, and diffused. The Pansy [F. *pensée,* probably from the drooping attitude of the flower, suggestive of thoughtfulness] is one of the finest of florists' flowers, and no flower has been more improved by cultivation. Another species has of late years been introduced into cultivation, *V. Altaica,* native of Siberia; and by itself, or by hybridization with *V. tricolor,* has become the parent of many garden pansies: in a wild state it has oval leaves and large yellow or purple flowers. The finest garden pansies are preserved and propagated with great difficulty, for unless they receive most careful cultiva-

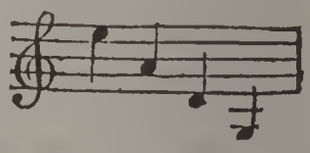
tion they quickly relapse to their wild forms. To satisfy the florists a pansy should have a round, flat, and very smooth edge, the petals thick and velvety, the three lower petals alike in their ground color, the lines or pencillings in the centre bright and distinct, the two upper petals—which always differ in color from the others—perfectly uniform, and the flower should measure at least an inch and a half across.—The SWEET-SCENTED VIOLET (*V. odorata*) is common in grassy places throughout Europe and n. Asia. The flowers are either of deep-blue color, or more rarely white. Several other species, with pale-blue flowers and destitute of odor, are common in meadows and woody glades in Europe.—The DOG VIOLET (*V. canina*) is one of the most common ornaments of hedge-banks.—N. America has many species, one of which, *V. blanda*, is sweet-scented. It has white flowers, and is found from Maine to Wisconsin and Kentucky. Other United States species of the stemless sort are the Round-leaved (yellow); the Lance-leaved and Primrose-leaved (both white); the Marsh Violet and Great-spurred Violet, the former alpine and n., the latter in central New York and n., rare; the fleshy-rooted blue or purple Common Blue Violet, Hand-leaf Violet, Arrow-leaved, Larkspur, and Bird-foot; and a number of leafy-stemmed species, such as the Dog Violet, the Long-spurred, the Pale, the Canada, the Yellow Downy, and the Halbert-leaved, with varieties. The Himalayas produce a number of species very similar to those of Europe. The roots of several species of Violets were formerly used in medicine. They contain a bitter alkaloid, *Violine*, which acts as an emetic and purgative. The petals of the sweet-scented Violet are used for preparation of *Juice* or *Syrup of Violets*, which is employed as a gentle purgative for children, also as a chemical test, being reddened by acids and rendered green by alkalies. The bruised leaves of *V. tricolor* are sometimes used as a remedy for ring-worm.—The DOG'S-TOOTH VIOLET (*Erythronium dens canis*) has no connection with this genus, but is a very beautiful flower of nat. order *Liliaceæ*.

VI'OLET MOSS (*Byssus Iolithus*): by some botanists ranked as a lichen, and by others as a fungus. It consists of simple articulated threads, and spreads over the 'Violet Stones' (q.v.) in the form of a delicate incrustation, at first reddish brown, but in a more advanced stage, yellowish green. It was formerly in use as a popular remedy for feverish cutaneous eruptions.

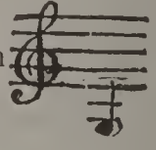
VI'OLET STONES: certain stones found on high mountains—as in Thuringia, on the Harz Mountains and the Riesengebirge—which, in consequence of being covered with what is called *Violet Moss*, emit an odor like that of violets. They retain this odor a long time, and it is increased by moistening them.

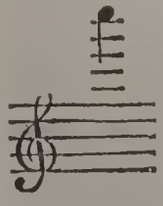
VI'OLIN: stringed musical instrument played with a

bow. It consists of a wooden sonorous chest—formed of two slightly arched surfaces, known as the back and belly respectively, united by sides or ribs, and with a curve or hollow on each side in the middle of the length—a neck or finger-board attached to the chest, and strings, fastened at one end of the belly by a tail-piece or projection of wood, and at the other to the head or extremity of the neck, where they can be tightened or slackened at pleasure by turning-pins. The strings thus passing over the belly are raised up from it by a bridge; and on the belly there are two sound-holes opposite each other, of a form resembling the letter *f*, or rather the long *f*. The sounds are produced by drawing a bow across the strings, the upper surface of the bridge being convexly curved, so as to enable the bow to be drawn along each string separately, without coming in contact with the rest (for mode of production of the notes, see SOUND). The modern violin has four strings of gut, the lowest covered with fine silvered copper wire, or sometimes, in the best instruments, with silver or even gold wire.

These strings are tuned in fifths, thus: 

and the highest string is called the first. The bow is held in the right hand, and the different sounds of each string are obtained by stopping, i.e., pressing it with the finger against the finger-board at certain distances, thus shortening the vibrating portion, and raising the pitch of the sound. Very high notes are produced by the Harmonics (q.v.) of the string, which, instead of being pressed against the finger-board, is touched lightly—the sound resulting from the vibration being, not as in ordinary cases, of the part of the string between the point of stopping and the bridge, but of a harmonic section of it. A peculiar modification of tone is produced by the application of the *mute* or *sordino*, a little wooden instrument placed on the bridge. A violin or other bow-instrument may occasionally be played *pizzicato*—i.e., with the fingers, as a harp or guitar. The compass of the violin

is about three octaves and a half, from  to

 , with all the intermediate semitones; but the

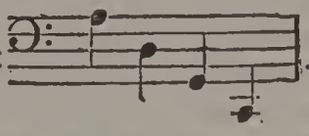
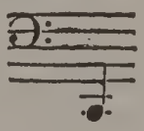
highest notes are apt to be harsh and squeaking. Though an instrument chiefly of melody, it is to a limited extent capable of harmony by double stops—chords of two notes

may be struck together, and three or four notes may be played in arpeggio. Few instruments can compare with the violin in power of expression and execution. It has an unlimited command over a very wide range of sounds, to which any degree of piano and forte, of staccato and legato, can be imparted. In orchestral music there are always two different violin parts for treble and alto, known as first and second violin; and the same is generally the case when the violin is used in concerted music, the usual arrangement of stringed quartette music being for two violins, viola, and violoncello.

Recent writers trace the origin of the violin to the Indian *Ravanastron*, still played by the class of Buddhist monks who go begging from door to door, and traditionally believed to have been the invention of Ravana, King of Ceylon, B.C. 5,000. From the Ravanastron sprang the *Goudok* of Russia and the *Crwth* of Wales—the latter in use before the 6th c.—both seeming to have differed from later instruments of the same tribe in having the upper surface of the bridge flat, so that all the strings had inevitably to be sounded at once. The Viol (q.v.) was the more immediate precursor of the violin and of its relatives of deeper pitch, the Violoncello (q.v.) and double bass. The earliest violins seem to have been those of Gasparo di Salo in Lombardy, 1560-1610. During the 17th c. the family of the Amati at Cremona, including Andrew, his sons Jerome and Antonio, and Nicolo, son of Jerome, produced violins whose tone and quality more recent makers have vainly sought to equal. Antonio Stradivari (1649-1737), also of Cremona, pupil of Nicolo, surpassed the Amati, if that were possible; and for a time the repute of Cremona was kept up by the families of the Guarneri and Ruggieri. Next to the Cremonese violins, in the estimation of connoisseurs, stand those of the Tyrolese makers Jakob Stainer and Matthias Klotz and his sons. Experience has shown that the minutest details of form and proportion, and the material of which each separate part is made, are of vital importance to the quality of the violin.—See Otto's *Treatise on the Structure and Preservation of the Violin;* Sandys and Forster, *History of the Violin;* Fetis, *Notice of Antonio Stradivari,* etc.; Hart, *The Violin* (1875).

VIOLLET-LE-DUC, *vyol-lā'lĕh-dük*, EUGÈNE EMMANUEL: French architect and archæologist: 1814, Jan. 27—1879, Sept. 17; b. Paris. He first devoted himself to the study of mediæval architecture. In 1845, after competition, he, with Lassus, was commissioned to restore the cathedral of Notre Dame, Paris. This great work (completed 1868) after 1854 was under the sole conduct of Viollet-le-duc. Meanwhile he directed other important works—e.g., the fortifications of Carcassone, the cathedral of Amiens, church of Notre Dame at Châlons-sur-Marne, the cathedral of Laon, etc. In the siege of Paris he organized an auxiliary corps of engineers which ren-

dered important services to the defense. He was elected as a republican to the Paris municipal council 1874, and thereafter was prominent in political life as a radical. His writings are very numerous; among them are: *Dictionnaire Raisonné de l'Architecture Française; Architecture Militaire au Moyen Age; Entretiens sur l'Architecture; Histoire d'une Maison; Habitations Modernes.* Viollet-le-duc was *collaborateur* with Désiré Charnay in preparing the magnificent work *Cités et Ruines Américaines.*

VIOLONCELLO, *vē-ō-lŏn-chĕl'lō* or *vī-ō-lŏn-sĕl'lō:* large instrument of the violin class, the modern form of the mediæval *viola da gamba* (see VIOL). It resembles the violin in shape, but is about twice its size, and has four gut strings, the lowest covered with silvered copper wire: it is tuned thus, in fifths:  . Its compass extends from  to . Its signature is usually the bass clef, the tenor or treble clef being used for the higher notes. When played it is held with the belly outward, between the player's knees, and rests on the floor by means of a 'standard' or wooden pin.

VIOLONE, n. *vī-ō-lō'nĕ* [It.]: a double bass viol, originally a very large *Viola da Gamba* (q.v.), with 3, 4, or 6 strings; also a pedal organ-stop of 16 feet tone, resembling the violoncello.

VIOMENIL, *vē-o-mā-nēl'*, ANTOINE CHARLES DU HOUX, Baron DE: soldier: 1728, Nov. 30—1792, Nov. 9; b. Fauconcourt, France. He entered the army at the age of 12 as sub-lieutenant; promoted captain 1747; served with distinction in the 7 years' war as colonel, and in the Corsican campaign as brigadier 1768-9. He came to America 1780 as major-general and second in command of the army sent by France to assist the colonies; the French king promoted him lieutenant-general 1781, and decorated him with the grand cross of St. Louis for his gallantry at Yorktown. He was governor of La Rochelle 1783-89; he received his death-warrant in defending the king at the Tuileries.

VIOTTI, *vē-ot'tē,* GIOVANNI BATTISTA: eminent Italian violinist and musical composer: 1753, Mar. 23—1824, Mar. 10; b. Fontanetto, in Piedmont. From his father, a veterinary surgeon, he learned the rudiments of music, and received lessons in violin-playing from Giovanni 1764. Two years later he was placed under Pugnani at Turin. After holding for a short time the appointment of first-violinist in the royal chapel at Turin, he relinquished that office, in order to travel in Europe with

Pugnani. In Berlin, St. Petersburg, Paris, and London, his playing created a *furore*. He visited London first 1792, and was engaged there at Salomon's concerts, and for a time as leader of the orchestra in the King's Theatre. A groundless charge of being a revolutionary agent drove him from England; but after living for a time in retirement at Hamburg, he returned to London, 1795, where he continued to reside until 1818, when he settled in Paris and resumed direction of the opera there. He retired in 1822 with a pension, but, returning to London, entered into ruinous speculations. He died in London.—His compositions include violin concerts and quartettes for violin, tenor, and violoncello, violin duets and solos, and a few pianoforte compositions. His playing was characterized by a vigor of style and purity, as well as brilliancy and elegance, previously unknown; and he has been considered the father of the modern violin school.

VIPER, n. *vī'pėr* [F. *vipère*—from L. *vīpĕra*, an adder, a snake—from *vīvus*, alive; *parĭō*, I bring forth—so called from its bringing forth living young: It. *vipera*]: venomous serpent of several species (see below); a very mischievous or malignant person. VI'PERINE, a. *-ĭn* [L. *vīperīnus*]: pertaining to vipers. VIPERINA, n. plu. *vī'-pėr-ī'nă*, a group of snakes. VI'PERISH, a. *-ĭsh*, viperous; malignant. VI'PEROUS, a. *-ŭs*, having the qualities of a viper; malignant.

VI'PER: any venomous snake of the genus *Vipera* and family *Viperidæ* (q.v.). The Common Viper or Adder, *V.* (or *Pelias*) *berus*, is found throughout Europe from n. Russia to the Mediterranean, and in many parts of England and Scotland, but not in Ireland. It seldom attains a length of more than 2 ft. The head is depressed, widening behind the eyes; the gape as long as the head. Like the rest of the family it has a pair of mobile fangs in the upper jaw. The neck is smaller than the back of the head. From the neck the thickness increases to near the middle of the entire length, and then diminishes to the vent. The tail tapers rapidly to a point. The characteristic markings are almost invariable; but the ground-color varies considerably, from nearly olive, rich deep-brown, or brownish yellow, to almost black. Thus, in England there is the 'black viper': also the 'red,' or the 'blue-bellied,' or an almost white viper with black markings—diversities which have led some naturalists to assign the snakes to distinct species; but *Pelias berus* is the only venomous serpent found in Great Britain. Its bite is attended with pain and serious consequences, but is seldom fatal. The remedies are generally the application of hot olive-oil, and the internal use of olive-oil and of ammonia, or strong stimulants such as brandy taken in large doses. The viper is ovoviviparous, the eggs bursting in the act of parturition, or immediately afterward: the investing membrane

is so thin and slight as to be easily torn. The young viper is coiled up so closely in the egg as to appear almost a solid mass; but the moment it is set free it is active, and ready to throw itself into an attitude of defense.

It has often been alleged that in times of danger the young of the viper seek refuge in their mother's open mouth and find temporary protection in her œsophagus. This has been disputed, but complete investigation is lacking. In America evidence goes to prove that the habit of giving refuge to the young is common with several non-venomous species that are viviparous.—There are no vipers in the new world, though the name is often popularly applied to one or more of its snakes.

VIPERIDÆ, *vī-pĕr'ĭ-dē:* family of snakes constituting, with *Crotalidæ* (q.v.), the *Viperina,* or third sub-order of *Ophidia.* The general characteristics of a viperidæ are wide, angular, depressed head, causing the neck to appear small in comparison; short, thick body; and tail tapering suddenly to a point. In some of the largest vipers, the short, unmistakable tail is only two inches in length. The head is mostly covered with scales, rarely plates, or only a few about the eyes and lips, or with extremely fine plates. The scales are carinated, often rough, even spinous. The ventral shields are broad, and the subcaudal plates in two rows. The nostrils are large, and in some species they close with a valve. This highly venomous family of serpents are furnished with a pair of long, curved fangs. In this order the upper maxillary, bearing two isolated fangs firmly fixed to it, is reduced to a mere wedge of bone, which is movably articulated, and by especial muscles rotates or rocks to and fro, and the fang with it. The action is volitional as a whole. The viperine snakes are often said to have 'movable fangs,' though the fangs themselves do not move independently, but only with the bone to which they are attached. Thus, when at rest, the fang, protected by a membranous sheath, lies supine along the jaw; but when in use springs down by the rotation of the maxillary bone, just as a scythe might point downward or horizontally by the movement of the handle. The fang has a canal in its interior, connected with a poison-gland, whose contents are ejected into the wound made by the fang in the act of biting. Behind the pair of functional fangs, others, in a rudimentary stage, are found, and may even create a wound, though, being as yet unconnected with the poison-duct, they do not convey venom into the wound. The lower law has numerous solid teeth of the ordinary form. Formerly the vipers were confounded with colubrine snakes; and even at the present day authorities differ in the arrangement of *genera* and *species,* on account of the forms running so much into each other. Dumeril gives 6 genera and 17 species; Wallace, 3 genera and 22 species; and Gray, 9

genera and 20 species. Strauch gives 3 genera: *Vipera* (with 20 species), *Echis* (with 1 species), and *Atheris* (with 3 species). Those of the family best known are the 'River Jack' of w. Africa, the Horned Viper or Cerastes (q.v.) of n. Africa and w. Asia, the Puff Adder (q.v.) of Africa, the Death Adder of Australia, Russell's Viper and the Carpet Snake of India. The cobra de capello and the Egyptian *Naja haje* also belong here. The viperidæ, as above mentioned, are mostly distinguished by their broad, flat, angular head; thick, heavy body; short, tapering tail; rough, carinated scales; and a generally hideous physiognomy, which seems to express their noxious qualities. Nevertheless some have a handsome exterior, and are adorned with dark, rich colorings and patterns. The *Daboia* of India is one of these, and, being of less clumsy form, has been named *Vipera elegans.* The true vipers, or those which have not the nasal fosse, are most largely represented in Africa, which has about 12 species. Europe has 3; India 2. The anomalous Death Adder (*Acanthophis antarctica*) of N. Australia, with its unmistakably venomous look, is included among the vipers, notwithstanding it has a pair of *fixed* fangs like the *Elapidæ.* The largest and deadliest species are found in tropical countries. They inhabit dry, sandy deserts, and are of retiring, sluggish nature. See LACHESIS; ASP; PUFF ADDER; RATTLESNAKE; etc.

VIPER'S BUGLOSS, *vī'pėrz bū'glŏs:* plant of the genus *Echium,* nat. order *Borragineæ;* having a calyx with five deep segments, an almost bell-shaped corolla with dilated throat and irregular limb, very long unequal filaments, and a bifid style. The species of this genus are large herbaceous plants or shrubs, rough with tubercles and hairs. Their flowers are often very beautiful. The COMMON VIPER'S BUGLOSS (*E. vulgare*), a large annual plant, is a native of Europe, growing in dry places, frequently in corn-fields, and is a troublesome introduced weed in Virginia, but rather rare in the n. states. Its flowers are at first reddish, and afterward blue. It derives its name, Viper's Bugloss, from spots on its stem, which somewhat resemble those of the viper —whence the property of healing vipers' bites was ascribed to it. Other herbaceous species are found in southern Europe, North and South America, and other parts of the world. Shrubby species are found chiefly in the Canary Islands and in s. Africa.

VIRAGO, n. *vĭ-rā'gō,* plu. VIRA'GOES, *-gōz* [L. *vĭrago,* a bold or manlike woman; an amazon—from *vir,* a man]: a female warrior; a woman of great stature, strength, or courage; a bold, masculine woman; hence, in modern usage, a bold, turbulent, impudent, or shrewish woman; a termagant; also, in *zool.,* a genus of ducks of the subfamily *Anatinæ,* the female of which has a peculiarity of the windpipe which usually belongs to male ducks

only. VIRAGINIAN, a. *vĭr-ă-jĭn'ĭ-ăn,* or VIRAGINOUS, a. *vĭ-rāj'ĭ-nŭs,* virago-like; termagant.

VIRCHOW, *fĕr'cho,* RUDOLF: pathologist and publicist: b. Schivelbein, Pomerania, 1821, Oct. 13; d. Berlin, 1902, Sept. 5. He was a pupil of Johann Müller; graduated in medicine 1843; and became prosector to the University of Berlin 1847. The same year he was commissioned by the government to investigate the cause and cure of typhus in Silesia; also, in conjunction with Reinhardt, he founded the Annals of Pathological Anatomy and of Clinical Medicine. The political commotions of 1848 drew him, with many other votaries of science, into the revolutionary vortex. He established a journal, the *Medical Reformer;* also a democratic club, where he distinguished himself as an orator. He was elected to the national assembly, but was not admitted, because he was, in a parliamentary sense, a minor. With the conservative reaction, Virchow had his journal suppressed, and lost his post, but was elected to the chair of pathological anatomy in Würzburg. His lectures at that university were widely popular for his novel views, particularly in cellular pathology. His reputation grew so great that he was recalled by Manteuffel 1856 to Berlin, where he reoccupied the chair of pathological anatomy, and rendered it the most famous in Europe. In 1859, when the liberal cause revived, he became member of the municipal council of Berlin, where he distinguished himself as a reformer of the arbitrary police system; and soon afterward was chosen deputy by the electoral college of Saarbrück, and by two of the Berlin colleges. He soon rose to the leadership of the opposition, and was an effective antagonist of the encroachments made in the name of the royal prerogative. He took the lead, 1863, Jan., in carrying the address in which the ministry were accused of having violated the constitution. Such was the energy of his opposition, that, 1865, June, he was challenged to a duel by Count Bismarck. In 1878 he retired from parliamentary life to apply himself exclusively to science, after having been for years a prominent member of the advanced liberals in the Reichstag.—Among his works are his inaugural thesis, *De Rheumate Cornea* (1843); *The Colloid Tumors of the Ovaries, and on Cancer* (1847); *Cholera* (1848-9); *Flexions of the Uterus, Scrofula, Tuberculosis, Typhoid Fever* (1850); *Cellular Pathology* (1850); *Amloid Degeneration* (1853); *Trichiniasis* (1860); *Tumors* (1862); *Cellular Pathology in Its Foundation on Physiological and Pathological Histology* (1871); a notable article *On the Standpoints of Scientific Medicine* (1878); *Of the Veddahs of Ceylon* (1881); and *The Burial-field of Coban* (1883). During the wars of 1866 and 70-1 Virchow was active in the sanitary arrangements for the troops in the field. He was elected honorary member of the Royal Medical Society of London 1856, and corresponding member of the

Medical Society of Paris 1859. On his 70th birthday he was presented with a medal of pure gold, weighing nearly 6 lbs., worth $1,700.

VIRDEN: Ill.; city in Macoupin co.; on the Jacksonville & S. L., and the Chicago & A. railroads; about 20 m. s.w. of Springfield and 30 m. s.e. of Jacksonville. It is in an agricultural region in which there are large beds of bituminous coal and valuable deposits of clay. The chief manufactures are brick and tile. The principal shipments are farm products, coal, clay products, and dairy products. Pop. (1900) 2,280; (1910) 4,000.

VIRE, *vēr:* ancient town of Normandy, France, department of Calvados; on the right bank of the Vire; 35 m. s.w. of Caen. It stands on a rock, is built of granite, and is surrounded by hills, between which are the celebrated valleys of Vire—*Vaux de Vire* (see VAUDEVILLE). It has an old church dating from the 12th to the 15th c., and ruins of a castle of the 12th c. Its industries are cloth and paper making, and cotton and wool spinning. Pop. 7,000.

VIRE, n. *vēr,* or VIRETON, *vĭr'ĕ-tŭn* [OF. *vire;* Sp., Port., *vira*—said to be a contraction of Sp., Port., *vibora* (perhaps influenced by OF. *virer,* to turn)—from L. *vipera,* a viper]: a bolt for a cross-bow, feathered in such a way as to cause it to rotate in its flight.

VIRELAY, n. *vēr'ĕ-lā* [F. *virelai*—from *virer,* to turn; *lai,* a lay]: a short poem of two rimes only, common in Old French; also a succession of stanzas on two rimes, the rime of the last line of each stanza becoming the rime of the first couplet in the next.

VIREO, *vĭr'ē-ō* [L., greenfinch], or GREEN'LET: genus of small oscine passerine birds; familiar name of any bird belonging to the family *Vireonidæ.* The species all are American, and most of them occur within the limits of the United States.—Bell's vireo (*V. belli*) was discovered by Audubon; its range is from Illinois w. and s. as far as Mexico; it is very small.—*V. atracapillus,* the Black-capped or Black-headed Vireo, is very rare and is found in Texas and Mexico.—*V. barbatulus,* the Black-whiskered Vireo, called from its notes 'whip-tom-kelly,' is seen in Florida and the West Indies.—Other species are: Blue-headed (or Solitary) Vireo; Gray Vireo (*V. vicinior*); Hutton's Vireo (California and Mexico); *V. pusillus,* or Least Vireo (Arizona); Philadelphia Vireo (e. North America from Hudson's Bay to Guatemala); *V. gilvus,* the Warbling Vireo (e. North America), an exquisite warbler—a small species, plainly colored; *V. noveboracensis,* the white-eyed Vireo, with white iris, yellow tint about the face; very small: this is the species longest and best known in the e. states; habitat, e. United States and southward; warbles sweetly; often makes its nest of waste paper.

VIREON'IDÆ: family of American oscine passerine birds, of which *Vireo* (q.v.) is the typical genus; the greenlets. The other genera are *Cyclarhis, Hylophilus, Laletes, Neochloe,* and *Vireolanius.* The vireo are all

VIRGIL.

small birds, less than 7 inches long, and of a greenish color. They are mostly insectivorous, and live in woods and shrubberies.

VIRESCENCE, n. *vĭr-ĕs'ĕns* [L. *virescens* or *virescen'-tem*, growing green; *virescĕrĕ*, to grow green—from *virērĕ*, to be green]: greenness; in *bot.*, the act of growing green through the development of chlorophy]: the production of green in petals instead of the usual coloring matter. VIRESCENT, a. *vĭr-ĕs'ĕnt*, approaching a green hue. VIRENT, a. *vī'rĕnt*, green; fresh.

VIRGATE, a. *vėr'gāt*, or VIR'GATED, a. *-gā-tĕd* [L. *virga*, a rod]: in *bot.*, long and straight like a wand; slender, straight and erect, as a *virgate* stem. VIR'GATE, n. an old measure of land, varying at different times and in different districts from 15 to 30 or 40 acres; a yardland. VIRGAL, a. *-găl*, rod-like; made of twigs.

VIRGIL, *vėr'jĭl* (more accurately and in full, VERGILIUS MARO, *vėr-jĭl'ĭ-ŭs mā'rō*, PUBLIUS): next to Homer, the greatest epic poet of antiquity: B.C. 70, Oct. 19—B.C. 19, Sept. 21; b. during the consulship of Crassus and Pompey, at Andes, a village near Mantua, Italy. The Roman writers differ greatly in the amount of biographical information which they themselves give us, and Virgil forms a marked contrast in this respect to his friend and contemporary, Horace. This is doubtless due in part to the nature of the themes which he treated, but in part also to his natural modesty and shrinking from every form of publicity. Fortunately, however, besides allusions of a casual nature in the works of other Roman writers, three ancient biographies of the poet have come down to us. The best of these is that of Ælius Donatus, of the 4th c., which, though distorted in some particulars, seems to be based upon good sources, and to give accurately the main details of Virgil's life.

Virgil was born in the country, in a district called Andes, not far from the modern Pietola, 3 m. below Mantua on the river Mincio. His father was of humble origin, and is said by some to have been a potter, by others the hired laborer of one Magius. He married Magia Polla, the daughter of his employer, and finally became himself the owner of a small estate, from which he made a living by farming and bee-keeping. He prospered sufficiently to be able to give his son a thorough education, at first in the neighboring town of Cremona, and afterward at Naples and Rome. Of these opportunities Virgil took the fullest advantage. He was always a diligent student, and like Cicero made a thorough preparation for his life work. At Naples he took up the study of Grecian literature under Parthenius; at Rome he not only applied himself to the regular curriculum of rhetoric and philosophy, but besides studied medicine, mathematics, and natural philosophy. He seems to have owed most to the Epicurean Siro, through whom he

probably became acquainted with the work of Lucretius, by which he was strongly influenced, as was recognized by the ancient critics. He also acquired a love for philosophical speculation which lasted throughout his life and profoundly affected his literary work. Virgil is said to have suffered constantly from dyspepsia and headache, and his ill-health, as well as his retiring disposition and studious habits, turned him from the usual political or military career. He held no public office of any sort, and in fact spent little time in Rome, finding the milder climate of Campania and Sicily more congenial. He seems to have amassed a comfortable fortune from the liberality of his patrons, for in his later life he owned several country places and a house at Rome on the Esquiline Hill. He enjoyed the friendship of the most distinguished men of his day, both in the world of letters and in public life. He never married, and his name is associated neither by himself nor by others with any affairs of the heart. After the completion of his course of study at Rome, we lose sight of Virgil completely for about ten years. It seems probable that he retired to his native place, and busied himself with the management of his paternal estate and with study. This quiet life was rudely interrupted after the battle of Philippi in 42 B.C. His estate was included in the proscriptions which were made in Cisalpine Gaul for the benefit of the veterans of Antony and Octavian, and he is said to have had a narrow escape from death at the hands of one of the soldiers. The details of the affair are confused and uncertain. We know, however, that Virgil went to Rome to appeal for protection, where he made the acquaintance of Mæcenas and of Octavian. He was unable to recover his property, but seems to have been given another estate, perhaps the one which he is known to have owned near Nola in Campania. His visit to the capital had, however, much more important consequences, which influenced his whole future life. He became a member of the literary circle which Mæcenas had gathered about himself, to which he was afterward the means of introducing Horace, and through the generosity of his patron was enabled to devote all his time to literary work and to study. In the year 19 B.C. Virgil undertook a journey to Greece and Asia Minor, with the intention of revising the *Æneid*, of which he had made a preliminary draft, and then devoting the rest of his life to his favorite philosophical studies. At Athens he met Augustus, who persuaded him to return with him to Italy. Virgil had contracted a fever from exposure to the sun at Megara, and was ill when he embarked. He died shortly after landing at Brundisium, and was buried near Naples. The exact location of his tomb is a matter of uncertainty.

We know something of the poet's personal appearance from the descriptions of Donatus. According to him Virgil was large of frame and dark complexioned, and had a certain air of rusticity. This description tallies

with the authentic portraits which we possess, which form a very small part of the great number which bear his name. The best are two mosaics, one discovered at Trier in 1884, the other at Susa in Africa in 1896. In character he was gentle and lovable, and so extremely modest that he is said to have taken refuge in the nearest shop or doorway to avoid notice.

Although Virgil, like nearly all of the great writers of his nation, was born outside of Rome, he is one of the most patriotic and intensely Roman of all his countrymen. He belongs with Horace to the national school; for, though, unlike his friend, he was strongly influenced by the Alexandrine Greek writers, to whom he was introduced by Parthenius during his studies at Naples, he drew from them only what was best in their work and avoided their defects. He owes to them the cosmopolitan tone which has made him popular with all nations and all ages, and his mastery in the treatment of the passion of love. He is not an Alexandrine in the sense in which that term is ordinarily used, but like Cicero developed a characteristic style of his own.

The first undoubtedly genuine work of Virgil which has been preserved is a collection of ten pastoral poems, called variously the *Eclogues* (*Eclogæ*) and the *Bucolics* (*Bucolica*). These were probably composed between the years 43 and 37 and are the first Roman representatives of that branch of poetical literature. They were, however, far from being an original creation, but on the contrary are modeled on the *Idyls* of Theocritus with a closeness of imitation which is rare even among Roman writers. The names of the characters are in most cases taken from the Greek original, and the landscape has nothing which suggests the scenes amid which Virgil passed his early life, but is throughout Sicilian. And yet the genius of the poet succeeded in impressing itself on this early work, and it has always justly been given a high rank in the history of Roman literature. The *Eclogues* fall into two distinct classes, each represented by five poems, the purely pastoral pieces, which sing of various phases of the life of the idealized shepherd, especially contests in song; and the allegorical poems, which introduce the poet himself and his contemporaries in the guise of shepherds. The latter are naturally the more original, and they are also by far the more difficult of interpretation. The most widely known of all is probably the 4th Eclogue, which celebrates the birth of a child, about whose identity there is a difference of opinion, who is to bring back the Golden Age to Italy. It owes its renown in a great measure to the belief, which became current in the Middle Ages, that it was a prophecy of the coming of the Messiah.

Virgil's next work dealt also with the country life with which he was so familiar and loved so much. Mæcenas and Augustus are said to have suggested to him the writing of a poem on agriculture, in the hope of making

farm life more attractive to the people of Italy, but the poet must have required little urging to induce him to take up a subject so congenial. He had an abundance of material at hand to draw on among the Greek writers, and the topic had been a favorite one with the Romans as well, though it had not as yet been treated in verse. Virgil expressly acknowledges his obligations to Hesiod, but he owes more to the Alexandrine writers Nicander and Aratus. In four books he writes of the management of fields, the growing of trees, the rearing of horses and cattle, and bee-keeping. He avoids with great skill the dryness of a didactic work by the introduction of such digressions as the praise of spring, and by a general lightness of touch which gives an attractive form even to the most commonplace details. He composed slowly and with loving care, and polished his language and versification to the highest degree of refinement. The *Georgics* have justly been called the most finished poem in the Latin language, and Addison even calls it the most finished of all poems.

After the publication of the *Georgics* in 29, Virgil set about the greater task of writing a national epic. This was a plan which he seems to have formed early in life and for which he had been preparing for many years. He was forced against his own judgment to take it up thus early by urgent requests from Augustus and Mæcenas. In this field he had not the advantage of being a pioneer, for Nævius, in his *Bellum Punicum*, and more particularly Ennius in his *Annales*, had treated of the early history of Rome in this way. The latter had connected the destiny of Rome with that of Troy, and his epic was regarded as a great achievement. Virgil could hardly depart radically from the plan of his great predecessor, but he surpassed him not only in finish of style, but also by introducing the philosophical reflection and the breadth of treatment which distinguish history from mere chronicle. He made very free use of the works of his predecessors, and among the Greeks not only of the *Iliad* and the *Odyssey*, but of the Cyclic poets and of Apollonius of Rhodes. The proud boast of Propertius, *nescio quid maius nascitur Iliade*, as well as the subject of the epic, at once challenged a comparison with the Homeric poems which was freely accepted in antiquity; but in modern times this has been detrimental to Virgil's fame. The comparison is unfair, because the *Æneid* and the Homeric poems really represent different types of the epic. The primitive epic, of which the *Iliad* and the *Oydssey* are unrivaled specimens, is not represented in Roman literature and is foreign to the Roman national character. The works of Nævius and Ennius, as well as those of Virgil and the later Roman epic writers, are of the historical type, and in this field the supremacy of Virgil is almost universally recognized. While the Homeric poems represent the gradual accumulations of generations of singers, the *Æneid* was composed as a

complete work of art, with a definite purpose, the glorification of Rome and of the Julian house. The introduction of the gods of the Greek pantheon is in the nature of 'epic machinery,' since Virgil's generation had no faith in them, and the poet himself was doubtless too much influenced by Lucretius, and by his philosophical studies in general, to be an exception to the prevailing skepticism. At the same time his nature was reverent and religious, and a desire to effect a revival of the old Roman piety doubtless formed part of his plan and was thoroughly in accordance with the wishes of his patrons. The *Æneid* describes the wanderings and adventures of Æneas from the time of the fall of Troy until the establishment of his destined empire in Latium. In accordance with the regular rule of epic composition the poet plunges at once *in medias res,* and begins his tale with the sixth year of the voyage of his hero. The story of the earlier years is told graphically by Æneas himself at Dido's court in Carthage. While the greatness of the poem can only be fully appreciated when it is studied as a whole, it is more generally known in part; the last six books, though full of beautiful episodes, are less generally read because of the numerous and somewhat monotonous battle scenes which epic tradition demanded of the poet, in which he is not at his best. Probably the most widely known part of the poem is the episode of Dido, which forms a complete epic tragedy, and bears witness to the poet's familiarity with the masterpieces of Greek drama. The unhappy Carthaginian queen, like Æneas, had her mission to perform and her empire to establish, but her plans were forced to give way before the mightier destiny of Æneas. Through the wiles of Venus, which even Juno's power cannot thwart, she falls in love with the Trojan hero, and strives to detain him in Carthage. He finally leaves her in obedience to the command of Jupiter, and Dido slays herself as his ships are passing out of sight. As she dies, she prays that there may be eternal hatred between Carthage and Rome, and the long and bloody struggle which ended in the destruction of the city which she founded forms the sequel to the tragedy. These wars furnished a motive for a great historical epic, which, however, found no worthier poet than the painstaking but insipid Silius Italicus, of the time of Nero and his successors. The desertion of Dido by Æneas finds little sympathy with the modern reader, and the 'pious Æneas' appears in many respects a somewhat pitiful hero, but from the ancient point of view his action was justifiable and even praiseworthy, due as it was to submission to the will of the gods. Virgil intends Æneas to be the representative of the old Roman virtues, steadfastness of purpose, endurance, fidelity to a trust, courage, and reverence for the gods. It is to the last quality especially, together with his devotion to his father, that he owes his epithet of *pius.* To the Roman reader he was the champion of

civilization against barbarism, represented by Turnus and his godless associates. So far as the form of the poem is concerned, we see in it Virgil's growing mastery of the heroic hexameter, and the results of his long years of study and training, and we may note an advance even in the progress of the work itself. It is the hexameter of the *Æneid* which deserves above all others the praise, 'the stateliest measure ever molded by the lips of man.'

But Virgil himself was conscious that he had not realized the ideal of his youthful days. In a letter to Augustus of the year 26, in answer to a request to see the poem or at least some part of it, he writes that he feels that he has been mad to undertake so great a task. A few years later, however, he was ready to read three books to the emperor, including the 6th, in which he inserted the tribute to the young Marcellus, contained in verses 860-886. It is said that Octavia, who was present, fainted as Virgil finished his effective rendering of these beautiful lines, and afterward presented the poet with 10,000 sesterces (about $500) for each verse of the memorial to her son. This story confirms in a general way the statement of Suetonius about Virgil's method of composing the *Æneid.* He is said first to have written a version in prose, and to have turned it into verse in no special order; and he seems to have followed the same plan in putting the finishing touches to his work. That he never completed the latter process is evident from various inconsistencies which appear in the poem, and more particularly, since absolute consistency is not demanded of a poet, from the numerous incomplete and less polished lines. It is shown also by his project of a three years' tour amid the scenes of his earlier books, and by the fact that on his deathbed he gave directions that the *Æneid* should be destroyed. This request was fortunately not granted, but Augustus had the work published, with only such revision as was absolutely necessary, by the poet's friends Varius and Tucca.

Besides the works of Virgil which are undoubtedly genuine, there have come down to us under his name a number of lesser poems: the *Culex, Ciris, Moretum, Diræ, Ætna,* and the *Copa,* together with a collection of shorter pieces, called *Catalepton* (minor poems). Donatus and Servius attribute poems with these titles to Virgil; and Lucan, Statius, and Martial mention a *culex* of Virgil. It is certain that the *Ætna* and the *Diræ* are not his work, a fact which in itself discredits the testimony of the grammarians; as regards the rest there is a difference of opinion. The majority of scholars are inclined to regard nearly all these poems as spurious, assuming that they were collected and attributed to Virgil in the time of Nero, a view which disposes of all the ancient testimony, except perhaps that of Lucan. It is argued besides that some of them are unworthy of the author of the *Georgics* and the *Æneid,* an objection to which too much weight should not be given, while

some, though not open to that charge, are in a manner wholly unlike that of Virgil as we know him. The arguments which have been based on certain metrical features of the poems seem to have little force. Just at present there is a growing tendency to claim these works for Virgil, and while the evidence in his favor cannot be said to be very strong, the same thing may be said of the contrary testimony. It is not likely that unanimity of opinion on this point will ever be reached.

Virgil's fame among his countrymen was immediate and permanent. He was hailed as the Roman Homer, and the efforts of a few jealous rivals to depreciate him were of no avail. His influence on the later Roman poetry was marked, notably on Persius, Silius, Statius, Ausonius, and Prudentius. The same thing is true of the later prose, for example, that of Livy and Tacitus. The *Æneid* was used as a text-book in the Roman schools as early as the days of Juvenal, and was made the subject of grammatical and stilistic commentaries by numerous writers. The writers of the decline not only imitated him freely, but introduced the custom of writing Virgilian *centos,* by arranging lines and half lines from his works in such a way as to give a sense entirely different from the original. This became a regular form of literary production, and they were even improvised. Among the Christians the works of Virgil escaped the general condemnation of the pagan literature, and he was believed to have received some measure of divine inspiration. From the Renaissance to the present time his influence on the poets of most European countries has been great. Dante, Chaucer, Spencer, Milton, and Tennyson, as well as many others, bear testimony to their acquaintance with Virgil; and his poems, especially the *Æneid,* have been translated into all the principal languages of Europe. It is only in comparatively recent times that the searching methods of modern criticism, especially in Germany, have brought Virgil's fame into question, and his detractors and his champions have in many cases shown equal lack of discrimination. The most common charges brought against him are those of inferiority to the Homeric poems and of lack of originality. The former point has already been discussed; in considering the latter we must bear in mind that the ancient ideas about literary work differed decidedly from those of our own day, and that wholesale borrowing from the work of one's predecessors was not considered to be at all improper. Furthermore Virgil had the power which all great writers have, of making what he borrowed his own; and, a thing which may be regarded as the supreme test, he not only imitated, but as he was able to inspire imitation.

Besides the Virgil of history there is a mythical Virgil, singularly unlike the original. In comparatively early times the ancient biographers associated prodigies, prophetic of his future greatness, with his birth, and the

adoption of his works by the grammarians as canons of usage gave him a reputation for vast learning. This feeling brought about the custom as early as the 2d century of consulting the *sortes Virgilianæ,* by opening the *Æneid* at random and drawing an omen from the words of the first passage on which the eye fell, a custom which that work has shared only with the Homeric poems and the Bible. As early as the days of Silius Italicus we see traces of a Virgilian cult, for the younger Pliny tells us that Silius made annual pilgrimages to Virgil's tomb, and kept his birthday with more ceremony than he did his own. A special series of legends of a most grotesque character grew up among the common people of Naples, who with an entire disregard of chronology and of historical truth associated his name with many marvelous inventions and with numerous undignified and disreputable adventures. These two streams of tradition united and found their way into the romantic literature of the Middle Ages, and even into works of a more serious character. They have given us the mythical Virgil, the necromancer and ally of the powers of darkness. His name was in consequence associated in the popular mind with *virga,* a magician's 'wand,' which led to the spelling Virgilius, and hence to our Virgil.

As regards the spelling of the poet's name, the Latin form Vergilius is established beyond question by inscriptional and other evidence as the only one until the 5th century. In English, Virgil was the current form until comparatively recent times, when Vergil was introduced in common with a general reform in the spelling of Greek and Latin proper names; this is the usual form in Germany. In England and in this country both forms are used, as may be seen from the biographical list given below.

The first printed edition of Virgil was published at Rome about 1469. Since then there have been many editions in all countries. The standard critical text is that of O. Ribbeck, Leipsic, 1859-68 (containing the famous *prolegomena*) and 1894-5 (without the *prolegomena*). The best edition in English is on the whole that of J. Conington, revised by H. Nettleship (4th ed., 1881-3). Of translations, which are numerous, may be mentioned those of Conington of the *Æneid* into prose (1872), and into verse (1873); of R. D. Blackmore, the well-known novelist, of the *Georgics* (1871); and of C. S. Calverly, of the *Eclogues,* published in the Works (1901).

For further information consult: C. A. Sainte Beuve, *Etude sur Virgile* (1870); W. L. Collins, *Virgil,* in *Ancient Classics for English Readers* (Philadelphia, 1878); Nettleship, *Ancient Lives of Vergil* (Oxford, 1879), and *Lectures and Essays* (Oxford, 1885); J. S. Tunison, *Master Virgil* (Cincinnati, 1888); R. Y. Tyrrell, *Latin Poetry* (New York, 1895); D. Comparetti, *Virgilio nel medio evo* (2d ed., Florence, 1896); (English transla-

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VIRGILIA, *vėr-jĭl'ĭ-â* [from name of L. poet *Virgil*]: genus of leguminous trees, comprising only one species, *V. capensis*, the Cape Virgilia, native of the Cape of Good Hope. It attains a height of 15-30 feet; has rose-purple flowers, pinnate leaves with small leaflets. It is cultivated as an ornamental tree. In Cape Colony the wood of virgilia is used for yokes, spars, etc.; but it is not durable, being liable to be attacked by worms. The American yellow-wood tree, formerly regarded as a species of virgilia, is now referred to *Cladastris*, a genus native in Kentucky and Tennessee.

VIRGILIAN, a. *vėr-jĭl'ĭ-ăn:* pertaining to the Roman poet Virgil, or to his style.

VIRGIN, n. *vėr'jĭn* [L. *virgo* or *virgĭnem*, a maid—probably from *virērĕ*, to bloom, to be fresh: It. *vergine:* F. *vierge*]: a woman who has had no carnal knowledge of man; a chaste and unpolluted maiden; a maid; also, a man who has preserved his chastity (Rev. xiv., 22): ADJ. modest; chaste; pure; untouched; fresh; new: V. in *OE.*, to play the virgin. VIR'GINAL, n. *-jĭn-ăl* [F.—L.]: an ancient keyed musical instrument, so named from being used by maidens or virgins: in form it resembled a small pianoforte, but had no legs; it had a compass of four octaves, furnished with a quill and jack like those of the spinet, and a single string to each note: ADJ. in *OE.*, pertaining to a virgin; maidenly: V. in *OE.*, to strike as on the virginal; to pat. VIR'GINHOOD, n. *-hûd*, virginity. VIRGINITY, n. *vėr-jĭn'ĭ-tĭ* [F. *virginité*—from L. *virginĭtas*]: maidenhood; state of having had no sexual intercourse with man; virgin purity. VIRGO, n. *vėr'gō* [L.]: one of the 12 signs of the zodiac, which the sun enters about Aug. 23, and which is represented by the figure of a clothed winged woman, with a spike of grain in her left hand. VIRGINIA, n. *vėr-jĭn'ĭ-a*, one of the asteroids: a kind of tobacco grown and manufactured in *Virginia*. VIRGIN HONEY, honey nearly white in color.

VIRGINAL: an obsolete stringed instrument played by means of a keyboard, like the modern pianoforte. It was in form like a box, or desk of wood without legs or supports, and was usually placed on a table or stand. The strings were of metal, one for each note, and the sound was made by means of pieces of quill, whalebone, leather, or occasionally elastic metal, attached to slips of wood which were provided with metal

springs. The compass was about three octaves. See PIANOFORTE.

VIRGINIA: the daughter of Lucius Virginius, whom Appius Claudius, the decemvir, endeavored to carry off from her parents. Her father, finding he could not save her by any other means, slew her in the open forum and raised an insurrection, which overthrew the decemvirate and restored the old magistracy (449 B.C.). The story is given in Livy, and Dionysius of Halicarnassus, and one of Macaulay's *Lays* is based on it.

VIRGINIA, *vėr-jĭn'ĭ-a:* state; one of the 13 original states in the American Union; till 1863, June 19, including the present state of West Virginia; popularly known as the 'Old Dominion,' also as the 'mother of presidents;' named in honor of Elizabeth, the Virgin Queen.

Location and Area.—Virginia is in lat. 36° 31′—39° 27′ n., long. 75° 13′—83° 37′ w.; bounded n. and n.e. by Maryland, e. and s.e. by the Atlantic Ocean, s. by North Carolina and Tennessee, w. and n.w. by Kentucky and West Virginia; extreme breadth e. to w. 425 m., extreme length n. to s. 205 m.; land surface 40,125 sq.m., water surface 2,325 sq.m., gross area 42,450 sq. m. (27,168,000 acres); coast-line about 120 m.; cap. Richmond.

Topography.—There are 6 natural divisions of territory, belts extending nearly n.e. to s.w., which are, in their order from the ocean: (1) the Tidewater country, (2) Middle Virginia, (3) the Piedmont section, (4) the Blue Ridge country, (5) the Great Valley of Virginia, (6) the Appalachian country. The Tidewater country is the e. and s.e. part of the state; is an irregular quadrilateral in shape, averaging 114 m. n. to s. and 90 m. e. to w.; is divided into 9 principal and seven minor peninsulas; and rises in three successive terraces to a height of 150 ft. Middle Virginia forms a right-angled triangle, 120 m., 174 m., and 216 m.; is a moderately undulating plain; reaches a height above tide water of 500 ft. in the n.w.; and shows both the Triassic and the Eozoic formations. The Piedmont section averages 25 m. wide by 244 m. long; extends from the Maryland line s.w. to the North Carolina line; and has an elevation at the foot of the Blue Ridge Mts. of 600-1,200 ft. This is a very picturesque region, with broken mountain ranges, isolated and connected knobs, valleys, 'coves,' water-gaps, and an abundance of running water. The Blue Ridge country is 310 m. long; expands in its s.w. part into a plateau of 1,230 sq. m.; and, with a general mountain elevation of 1,460 ft., shows Rockfish Gap, 1,996 ft., Mt. Marshall, 3,369 ft., the Peaks of Otter, 3,993 ft., and the Balsam Mountain, 5,700 ft. The Great Valley of Virginia extends from the Potomac to the Tennessee line, or more than 330 m.; of which 305 m. are in Virginia, and the remainder in West Virginia; is bordered e. by the Blue Ridge, and w. by the Kittatinny or

Area in Square Miles, 42,450. Population, 1,854,184,

Number of Counties, 100. Capital of State, Richmond.

North Mts.; and is really 5 continuous valleys—viz., the Shenandoah, 136 m. long; the James river, 50 m.; the Roanoke river, 38 m.; the Kanawha or New river, 54 m., and the Holston or Tennessee river, 52 m. The Appalachian country is traversed its whole length by the Appalachian or Alleghany system; comprises a series of narrow, parallel valleys, extending n.e. to s.w., separated from each other by equally narrow and parallel mountain ranges; is an irregular belt 260 m. long and 10-50 m. wide; and is noted as a grazing country.—There are two systems of inland waters—the Atlantic, whose waters drain six-sevenths of the state, and the Ohio, whose waters drain the other seventh of the state and reach the Ohio river either directly or by the Tennessee and Big Sandy rivers. Nearly every part of the state is well watered, and the rivers flow in every direction. The principal rivers are the Potomac, navigable for 110 m. from its entrance into Chesapeake Bay, 65 m. from the ocean, with the Shenandoah and South Branch as largest tributaries; the Rappahannock, navigable to Fredericksburg, 92 m. from its mouth at the bay, 40 m. from the ocean; the York, reaching more than 40 m. from the bay to the junction of its branches, the Pamunkey and the Mattapony, both navigable for many m. by light-draught vessels; the James, navigable to Richmond, and, with its numerous tributaries, draining more of the state than any other river; the Kanawha, which rises in North Carolina, flows through Virginia and West Virginia, and empties into the Ohio; and the Holston and Clinch, which drain the s.w. part of the state, and empty into the Tennessee river.—The soil in the Tidewater country is alluvial, with rich loam in the second terrace, and level and poor land in the ridge region; in Middle Virginia it is generally fertile and easily worked, and especially rich in the bottom lands of the streams; in the Piedmont section Epidotic rocks prevail, yielding red, gray, and yellow soils; in the Blue Ridge country the peculiarities of the Piedmont section are found, besides an abundance of greenstone rock; in the Great Valley the greater part is a stiff, clayey loam, with some slaty belts containing decomposed aluminous rocks; and in the Appalachian country there are belts of sandstone that are very poor, and belts of limestone and shale that are very rich, with alluvial lands along its many streams.

Climate.—The climate is healthful, with mean annual temperature for the state of 56°, for the Tidewater country 58°, for the Middle and Piedmont 35.60°, and for the Great Valley 54°; average mean for the state in Jan. 42°, in July 78°; the mean annual rainfall for the state 40-50 inches.

Geology.—The eastern part or coast line of Virginia is of Tertiary formation, consisting of sands, clays, and marls, while further inland Miocene strata occur and

abut against granite, gneiss, and other metamorphic rocks. This metamorphic belt contains deposits of gold and iron. Two secondary belts cross the state parallel to the Blue Ridge and contain extensive coal measures. The valley is of lower Silurian formation.

Minerals.—V. is rich in coal and iron, and there are also mines of gold, lead, copper, zinc, barytes, manganese, and salt. The first gold and the first coal mined in the U. S. came from V. Granite, sandstone, limestone, marble and slate suitable for building are quarried. All of these products are very valuable, the s. w. being the richest mineral section of the state. Mineral waters, clay products, and cement are also very profitable mineral products.

Agriculture.—Although corn is far and away the most valuable crop in the state, tobacco is the most distinctive. The economic history of colonial V. is essentially a record culture, and to this day Danville, Lynchburg, and Richmond are in the largest tobacco markets in the United States, their combined sales amounting to about 12 per cent, of the production of the country. Other principal crops are hay and forage, wheat, oats, buckwheat, rye, and barley. The cultivation of small fruits and early vegetables is also enormously profitable, as are dairy products, and poultry and eggs. The cotton crop is comparatively insignificant, but peanuts are important, while the raising of live stock forms a very valuable industry.

Fisheries.—These are important and supply large quantities of fish which are shipped to other states. The oyster culture is also growing and is the means of bringing in large returns each year.

Manufactures.—Although V. is an agricultural state, there has been considerable growth in its manufacturing industries, its own iron mines, forests, and tobacco and cotton fields furnishing abundant raw material. The principal manufactures are lumber and timber; tobacco products; iron and steel; railroad cars; foundry and machine shop products; and leather goods, the annual aggregate value of all manufactures being well over $150,000. The lumber industry is notably extensive.

Commerce.—The imports of merchandise at the ports of Alexandria, Newport News, Petersburg, Norfolk and Portsmouth, and Richmond aggregate about $6,000,000, and the exports about $50,000,000 a year. The excellent harbor at Hampton Roads makes a natural shipping point for a large section of the Mississippi Valley and a port of entry for goods from foreign countries.

Transportation.—Steamboats and sailing vessels still furnish means of transportation between points in the tidewater district, but in the interior the canals have been filled up and to-day practically every section can be reached by railroad, there being a total trackage of about 4,300 miles. Besides the railroad lines steam-

1. St. John's Church, Richmond. Here Patrick Henry made his famous speech.
2. Bruton Parish Church, Williamsburg, in 1750. The oldest church building now in use in America.

boats ply regularly between the V. seaports and the cities of the world. There is also an electric street railway system.

Finance and Banking.—The total assessed valuation of property, including both personal and realty, is $579,565,539, the tax rate $3.50 per $1,000, and the bonded debt $24,986,959. There are about 250 state and about 150 national, besides a very few private banks in V., while both Norfolk and Richmond do good clearing house businesses.

Religion.—The strongest denominations in the state are the Regular Baptists (colored); Methodist Episcopal, South; Regular Baptist, South; African Methodist; Presbyterian, South; Protestant Episcopal; Methodist Episcopal; Disciples of Christ; Roman Catholic; Lutheran, General Synod, etc.

Education.—V. spends annually about $3,500,000 in the maintenance of its public schools, in which there are nearly 400,000 pupils enrolled, with about 10,000 teachers. For technical and advanced education and the study of the professions the state has made provision in its state institutions, as follows: The State University, Charlottesville; Virginia Military Institute, Lexington; William and Mary College, Williamsburg; V. Polytechnic Institute, Blacksburg; Miller Manual Labor School, Albemarle; Female State Normal School, Farmville. In addition to these Washington and Lee University is located at Lexington, and there are many denominational colleges throughout the state.

History.—The first permanent settlement by the English in America was made 1607, May 13, when a party of 105 colonists sent out by the Virginia Co. of London, to whom King James I. had granted the terr. 34°—38° n. lat. and from the sea 100 miles inland, landed at the present Jamestown, on the James river. The expedition was commanded by Christopher Newport, and was accompanied by Bartholomew Gosnold, John Smith, Edward M. Wingfield, and the Rev. Robert Hunt. This attempt to colonize the new world was saved from absolute failure by the exertions of John Smith, who assumed the direction of affairs and managed the colony till within a short time of the arrival of officers from England, appointed in accordance with a new charter granted to the reorganized London Company. In 1609 the new officers, Lord de la Warr, governor, Sir Thomas Gates, lieutenant governor, Sir George Somers, admiral, Christopher Newport, vice-admiral, and Sir Thomas Dale, marshal, organized a new expedition of 9 vessels and 500 people. The lieutenant governor, admiral, vice-admiral, and marshal accompanied the expedition, which lost two vessels on the voyage. Just as John Smith was obliged by a wound to return to England, the lieutenant governor, admiral, and vice-admiral arrived at Jamestown, with 150 men and provisions for the vessel wrecked at the Ber-

mudas. They found the colony much reduced in numbers, and were about abandoning the settlement, in 1610, June, when Lord de la Warr appeared with 3 vessels, supplies, and more colonists. Uniting the two parties, the governor undertook to establish a permanent form of government at Jamestown, and built a trading-post at Hampton; but was compelled by impaired health to return to England 1611. Sir Thomas Dale, who had arrived with 300 more colonists, succeeded him, and was soon superseded by Sir Thomas Gates, who had brought over 350 additional colonists. Settlements were made at the present Dutch Gap and City Point. Gates soon returned to London; Dale resumed the executive office for a brief period, and, returning home, left the direction of affairs in the hands of Capt. Samuel Argall; and 1618 Lord de la Warr, prompted by the protests of the colonists against Argall's tyranny, determined to resume his duties as governor, but died while entering Delaware Bay. Sir George Yeardley, who was lieutenant governor 1616-7, was appointed governor 1619, and gave the colonists a profitable and popular administration. Immediately after assuming the office, he convened at Jamestown an assembly of popularly elected delegates from the different plantations, the first elective body in America, and began promoting immigration, agriculture, and the cultivation of tobacco. In 1619 slavery was first established in the new world, the first slaves being 100 white convicts from British prisons, who were sent over by the king's order to be sold for servants for a term of years, and 20 negroes from Africa, taken to Jamestown on a Dutch man-of-war and sold for slaves for life. In 1621 a written constitution for the colony was granted, which provided for a representative government and trial by jury; 1622 the James river settlements were attacked by the Indians, who massacred nearly 350 people; and 1624 the Virginia Company was dissolved, and the colony became a crown possession. The people reluctantly submitted to the Commonwealth 1651, but promptly reaffirmed their loyalty to the Stuart dynasty 1660. The laws of the colony, which were revised 1632, were again revised 1661-2; the Church of England was re-established; and stringent laws were passed against all religious opponents. In 1676 the oppressive administration of Sir William Berkeley, added to a levy of additional taxes, culminated in an uprising known as 'Bacon's rebellion,' from Nathaniel Bacon, a popular leader, which was followed by the removal of Berkeley and the appointment of Lord Culpeper as governor. Williamsburg was founded 1699, and the seat of government was transferred thither 1700. The code was revised a fifth time 1705, and in it was inserted a declaration that slaves were real estate. Virginia suffered severely in the French war 1754, in which George Washington first became conspicuous as commander of the colonial troops. In 1764 the British parliament asserted the right

to impose taxes on the colonies without permitting representation and without the consent of the people. This led to a strong protest by the Virginia house of burgesses; and in the following year, when the parliament passed the stamp, mutiny, and quartering acts, the assembly adopted the resolution offered by Patrick Henry denying the right of any foreign body to impose taxes on the colony. The colony was not represented in the first colonial congress (1765, Oct.), but the action and purpose of that body were heartily approved. A battle between the colonists and Indians occurred at Point Pleasant, on the Ohio river, 1774; the opposition of the people to the acts of congress led Lord Dunmore, the governor, to dissolve the assembly 1773 and 4; the governor was forced to take refuge on a British man-of-war, and was declared by the assembly to have abdicated his office 1775, June; and a convention of delegates at Williamsburg issued a declaration of rights 1776, May, and adopted a state constitution June 12.

During the revolutionary war, naval attacks were made by the British on Norfolk, Portsmouth, and Gosport (1779); Richmond was captured and burned by Benedict Arnold (1781, Jan.); Jamestown was the scene of a battle (1781, July 9); and Lord Cornwallis surrendered his army to Washington at Yorktown (1781, Oct. 19). Virginia was ably represented in the federal constitutional convention, and ratified the constitution 1788, June 25.

For details of the part born by Virginia in the civil war, see UNITED STATES OF AMERICA—*History*. After the close of the war, the Pierpont, or loyal, state government was recognized by Pres. Johnson, and Gov. Pierpont was appointed provisional governor.

In 1868 a new constitution was adopted. Among various new features therein embodied was that of negro suffrage. There was much dislike of the new instrument, which was not submitted to popular vote until July 1869, when it was adopted by a large majority, though the clause disfranchising confederate officials and demanding an oath of past loyalty, was rejected. G. C. Walker was elected governor; United States senators were also chosen, the 14th and 15th amendments were ratified, and the military occupation, never required, was brought to an end. In 1870, Jan. 26, Virginia was readmitted to the Union. There was soon trouble in connection with legislation respecting the state debt. By a bill passed in 1871, two thirds of the debt of Virginia was funded into bonds, the coupons of said bonds to be held receivable in payment for taxes assessed. The remaining one third was held to be the suitable share of West Virginia, though the latter state refused to admit such obligation. In 1872 the Virginia state legislature repealed the tax-coupon arrangement of the law; but the courts decided that the state was under obligation to receive the

bonds, even should the treasury be thereby kept bankrupt. At that time $17,000,000 in these bonds had been funded. Attempts toward a compromise were made, and conflicts between federal and state courts were frequent. In 1891-2 a settlement was finally arrived at. The bondholders received for bonds and coupons amounting to $23,000,000 the sum of $19,000,000 in new century bonds. During the period of discussion regarding the state debt, politics was much affected by the question; a (readjuster) party was formed, finally absorbed by the republican, and elections were based on the matter. The negro vote was divided. A constitutional convention, held in 1901-2, had as its chief objects in view the restriction of the suffrage and financial retrenchment. The new constitution was proclaimed 1902, May 9, but was not submitted to popular vote. Virginia has been throughout almost steadily democratic in federal politics. In 1860 it voted for John Bell, the constitutional union nominee, and in 1872 for Grant; but otherwise it has consistently supported the democratic national candidates. In 1881 the 100th anniversary of the surrender of Lord Cornwallis to Washington at Yorktown was celebrated by the laying there of the corner-stone of a national memorial (Oct. 18). At the time of the Spanish-American war, in 1898, an extensive military camp, Camp Alger, was established and maintained near Falls Church, Fairfax co.

The 300th anniversary of the settlement of the state was celebrated in 1907 by an international exposition at Jamestown.

Government.—The executive authority is vested in a governor elected for 4 years, and ineligible for a second successive term; a lieutenant governor, elected at the same time and for the same term; secretary of state, treasurer, and auditor, elected for 2 years by the legislature; and second auditor, attorney general, superintendent of education, superintendent of land office, commissioner of agriculture, and adjutant general.—The legislative authority is vested in a general assembly, comprising a senate of 40 mem., elected for 4 years, and a house of representatives of 100 members, elected for 2 years. The legislature meets biennially on the second Wednesday in January, in odd-numbered years, and sessions are limited to 90 days each. Lunatics, idiots, convicts, duellists, U. S. soldiers, and nonpayers of capitation tax are excluded from voting; and only such persons who are entitled to vote and hold office are competent for jury duty.—The judicial authority is vested in a supreme court, comprising a presiding judge and 4 judges, all elected by the legislature in joint session for 12 years; in a circuit court in each of the 16 judicial circuits into which the state is divided, each with a judge elected by the legislature for 8 years; and in a co. court in each co., with a judge similarly chosen for 6 years. Each city and town with 5,000 population is entitled to a corpora-

tion or hustings court, with a judge elected by the legislature for 6 years. The attorney general is elected for 4 years by the people.

The successive governors, with their terms of service, are as follows: *Under the Virginia Co.:* Edward M. Wingfield 1607; John Ratcliffe, 1607-8; Capt. John Smith 1608-9; Sir George Percy 1609; Thomas West, Lord de la Warr, 1609-11; Thomas Dale 1611-16; George Yeardley 1616-17; Samuel Argall 1617-19; Sir George Yeardley 1619-21; Francis Wyatt 1621-25; *Under the Crown:* Sir George Yeardley 1626-7; Francis West 1627-8; John Potts 1628-9; John Hervey 1629-35; John West 1635; John Hervey 1635-39; Francis Wyatt 1639-41; Sir William Berkeley 1641-45; Richard Kemp 1645; Sir William Berkeley 1645-52; *Under the Commonwealth:* Richard Bennett 1652-56; Edward Digges 1656-58; Samuel Matthews 1658-60; *Under the Crown:* Sir William Berkeley 1660-77; Herbert Jeffries 1677-8; Henry Chicheley 1678-9; Thomas, Lord Culpeper, 1679-80; Henry Chicheley 1680-84; Lord Howard, Effingham, 1684-89; Nathaniel Bacon 1689-90; Francis Nicholson 1690-92; Sir Edmund Andros 1692-98; Francis Nicholson 1698-1704; Earl of Orkney 1704-5; Edward Nott 1705-6; Edmund Jennings 1706-10; Robert Hunter 1710; Alexander Spotswood 1710-22; Hugh Drysdale 1722-26; Robert Carter 1726-7; William Gooch 1727-49; John Robinson, Sr., 1749; Lord Albemarle 1749-50; Louis Burwell 1750-52; Robert Dinwiddie 1752-58; John Blair 1758; Francis Fauquier 1758-68; John Blair 1768; Norborne Berkeley, Lord de Botetourt, 1768-70; William Nelson 1770-72; John, Lord Dunmore, 1772-76; *Under State Constitution:* Patrick Henry 1776-79; Thomas Jefferson 1779-81; Thomas Nelson 1781; Benjamin Harrison 1781-84; Patrick Henry 1784-86; Edmund Randolph 1786-88; Beverly Randolph 1788-91; Henry Lee 1791-94; Robert Brooke 1794-96; James Wood 1796-99; James Monroe 1799-1802; James Page 1802-05; William H. Cabell 1805-08; John Tyler 1808-11; James Monroe 1811; George W. Smith 1811-12; James Barbour 1812-14; Wilson C. Nicholas 1814-16; James P. Preston 1816-19; Thomas M. Randolph 1819-22; James Pleasant 1822-25; John Tyler 1825-27; William B. Giles 1827-30; John Floyd 1830-34; Littleton W. Tazewell 1834-36; Windham Robertson 1836-7; David Campbell 1837-40; Thomas W. Gilmer 1840-1; John Rutherford 1841-2; John M. Gregory 1842-3; James McDowell 1843-46; William Smith 1846-49; John B. Floyd 1849-52; Joseph Johnson 1852-56; Henry A. Wise 1856-60; John Letcher 1860-64; Francis H. Pierpont 1864-68; Henry H. Wells 1868-70; Gilbert C. Walker 1870-74; James L. Kemper 1874-78; Frederick W. W. Holliday 1878-82; William E. Cameron 1882-86; Fitzhugh Lee 1886-90; Philip W. McKinney 1890-94; Charles T. O'Ferrall 1894-98; J. Hoge Tyler, 1898-1902; A. J. Montague, 1902-06; Claude A. Swanson 1906-10; W. H. Mann, 1910—.

Counties, Cities and Towns.—Virginia had (1900) 100 counties. In 1880 the most populous counties were: Henrico 82,703; Norfolk 58,657; Pittsylvania 52,589; Campbell 36,250; Augusta 35,710; Halifax 33,588; Albemarle 32,618; Bedford 31,205; Buckingham 29,567; Washington 25,203; and Franklin 25,084. The most populous *cities and towns* were: Richmond 63,600; Norfolk 21,966; Petersburg 21,656; Lynchburg 15,959; Alexandria 13,639; Portsmouth 11,390; Danville 7,526; Staunton 6,664; Manchester 5,729; Fredericksburg 5,010; and Winchester 4,958. In 1900 the *counties* ranked: Norfolk 50,780; Pittsylvania 46,894; Halifax 37,197; Rockingham 33,527; Accomac 32,570; Augusta 32,370; Bedford 30,356; Henrico 30,062; Washington 28,995; Albemarle 28,473; Mecklenburg, 26,551; Franklin 25,953; Tazewell 23,384; and Fauquier 23,374. The leading *cities and towns* were: Richmond 86,050; Norfolk 46,624; Petersburg 21,810; Lynchburg 18,891; Roanoke 21,495; Alexandria 14,528; Danville 16,520; Manchester 9,715; Staunton 7,289; Charlottesville 6,449; Winchester 5,161; Fredericksburg 5,068; and Newport News 19,635.

Politics.—State, congressional and presidential elections are held on Tuesday after the first Monday in November. Virginia had 12 electoral votes under the apportionment on the 1880 census, and no change was made in the 1890 or 1900 apportionment. For the presidential vote, see PRESIDENT AND VICE-PRESIDENT, ELECTIONS OF.

Population.—In 1790 the population of Virginia was 747,610; (1800) 880,200; (1810) 974,600; (1820) 1,065,116; (1850) 1,421,661; (1860) 1,596,318; (1870) 1,225,163; (1880) 1,512,565; (1890) 1,655,980; (1900) 1,854,184; (1910) 2,061,612. According to sex, nationality, and color, the population is divided as follows: Males, 925,897; females, 928,287; native born, 1,834,723; foreign born, 19,461; whites, 1,192,855; negroes, including all persons of negro descent, 660,722; Chinese, 243; Japanese, 10; Indians, including those taxed and not taxed, 354. According to school and voting age, the division is as follows: Total of school age, 5 to 20 years, 704,771; including 435,612 whites and 268,962 negroes; total of voting age, 447,815, including 436.389 native born, 11,426 foreign born, 301,379 whites, 146,122 negroes, and 113,353 illiterates. The average density of population to the square mile is 46.2. The chief cities are as follows: Richmond (q.v.) (127,628); Norfolk, (67,452); Petersburg (24,127); Roanoke (34,874); Newport News (20,205); Lynchburg (29,494); Portsmouth (33,190); Danville (19,020); Alexandria (15,329).

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ginia (1860); Kercheval, *A History of the Valley of Virginia* (1850); Jefferson, *Notes on the State of Virginia* (1787); Forrest, *Norfolk and Vicinity* (1853); Foote, *Sketches of Virginia* (1855); Jones, *Army of Northern Virginia* (1880); Boyd, *Resources of Southwest Virginia* (1881); Waddell, *Annals of Augusta Co., Va.* (1888); Pearson, *Household Scenes in the Old Dominion* (1853); *Virginia Magazine of History and Biography;* book on the Civil War and Virginia State Reports.

VIRGINIA, Ill: city, county-seat of Cass co.; on the Chicago, P. and St. L. and the Baltimore and O. S. railways; about 30 m. w. by n. of Springfield. It is in a rich farming section. The chief industries are connected with farming and dairying. The city has a high school, elementary schools, and the library of the Central Illinois Science Society. There are two national banks and one state bank, having a combined capital of $160,000 and deposits amounting to $388,960. Pop. (1890) 1,602; (1900) 1,600; (1910 est.) 1,620.

VIRGINIA CITY, Nev.: city, county-seat of Storey co.; on the Virginia and Truckee railroad; about 200 m. n.e. of San Francisco and 14 m. n.e. of Gunnison. It is on the e. side of Mount Davidson, about 7,825 ft. above the level of the sea. It was settled in 1859, when the famous Comstock Lode was discovered, and chartered as a city in 1864. Mines under the city have produced nearly $400,000,000 in gold and silver bullion. There is still considerable silver mining in the vicinity. The city has a daily supply of 10,000 gallons of water for use for domestic and mining purposes, brought from the Sierra Nevada Mountains, 30 m. w., at a cost of $2,500,000. The principal mines are drained by the Sutro tunnel (4 miles long, cost $4,500,000) at a depth of 1,650 ft. The deepest mining works have a depth of 3,000 to 3,300 ft. Numerous great mining plants have been erected in the city at a cost of from $350,000 to $1,000,000 each. The city has gas and electric light plants and a weekly and two daily newspapers. The Miners' Union Library, the court-house, churches, and schools are the principal buildings. Pop. (1880) 10,917; (1890) 8,511; (1900) 2,695; (1910) 2,244. The decrease in population is mainly due to the decline in the price of silver.

VIRGINIA CREEPER: a very ornamental American climbing shrub (*Parthenocissus*, or *Ampelopsis, quinquefolia*). It is frequently confounded with poison-ivy, and the two plants often grow together; but it should be remembered that the innoxious creeper is distinguished by its leaves, which are not shining, and are palmately parted into five divisions, whereas the poison-ivy's leaves have but three leaflets and are glossy. The small, white five-merous flowers, with spreading petals, are in ample panicles, but are not so conspicuous as the fruit, which consists of dark-blue berries, on red pedicels. They are

ripe in autumn, and are set off by the rich tones of crimson which the foliage assumes at that season. The Virginia creeper, or American ivy, or woodbine, as it is variously styled, is one of our most decorative vines. It travels over rocks and fences, sending out delicate trailing branches, with the leaves regularly diminishing in size down to the folded ones near the curving tip. They soon start climbing by numerous tendrils, which are often tipped with disk-like enlargments, and that adhere to rough surfaces of walls or trees, and are further supported by aerial roots, springing from the stems. Compare POISON-PLANTS.

VIRGINIA FENCE: a rail fence common in the United States and Canada, known also as *snake-fence, worm-fence,* and *stake-and-rider fence.* It consists of tiers of split rails laid horizontally in a zigzag manner, the ends resting on each other and generally braced or kept in place by a pair of posts driven slantingly into the ground at the angle formed by the intersection of two tiers.

VIRGINIA MILITARY INSTITUTE: a state school located at Lexington, Va. It was established in 1839 by act of the legislature, and opened to students in the same year. It is governed by a board of visitors consisting of the superintendent of public instruction, and the adjutant-general, members *ex officio,* and nine other members appointed from different sections of the state by the governor with the approval of the senate. In accordance with the laws of Virginia the professors and officers hold commissions in the state militia, and the students are organized as a military corps of cadets. The school played an important part during the civil war; in April, 1861, the cadets were ordered to Richmond, where they took part in drilling volunteers; in 1862 the institute was reopened; and in 1864, May, the cadet corps was ordered out for active service and took a leading part in the battle of New Market, Va. During the war the cadets were in active service 13 months. In 1864, June, the buildings and equipment were burned by the federal army; in 1865, Oct., the institute was reopened, the buildings and equipment rapidly restored, and the course of instruction greatly improved and extended. The regular course covers four years, and though largely scientific and technical, includes some general culture subjects.

For military instruction and drill the cadets are organized in a battalion of four companies; the discipline is strict, the regulations being based on those of West Point. Instruction is given in infantry and artillery tactics, ordnance and gunnery, military science and the art of war, and military engineering. A certain number of cadets, not less than 50, are admitted each year as state cadets, without charge for tuition or board. The institute is located outside the city on a hill overlooking

Wood's creek; the new Academic building was completed in 1900. The library contains 14,000 volumes, the students number 300 and the faculty and military staff 30.

VIRGINIA POLYTECHNIC INSTITUTE, The: located at Blacksburg, Montgomery co., Va. It was established as the Virginia Agricultural and Mechanical College by the state of Virginia in 1872, in accordance with the provisions of the land grant act of 1862. In the same year it was opened to students. Its name was changed by authority of the legislature in 1896 to Virginia Polytechnic Institute. It is under the control of a board of visitors, consisting of the superintendent of public instruction of the state, the president of the state board of agriculture and immigration, *ex officio* members, and eight members appointed by the governor with the approval of the senate. One half of the eight members are appointed every two years for terms of four years. The institute offers eight courses of four years, each leading to the degree of B.S., and two short courses each in practical mechanics and agriculture. The students maintain two literary societies, each of which occupies a well furnished hall. The institute is situated on the crest of the Alleghanies, at an elevation of more than 2,000 ft. The campus contains 90 acres, the farm 400 acres. In addition the institute has leased for a term of years 750 acres of land lying contiguous to its farm. The plant consists of more than 50 buildings, including the shops and farm buildings. The Science hall, a new dormitory, and an infirmary, completely equipped with all modern conveniences, were added in 1903. There are a number of handsome buildings, including a dormitory, a chapel and an auditorium, an engineering and an agricultural hall. The income is derived in a large measure from the land grant fund of 1862, and the national appropriation in accordance with the law of 1890. In recent years the state has also shown its wisdom by adopting a generous attitude toward the institution. The income amounts to $83,390. Of this amount $36,640 is from the national government and $46,750 from the state. The faculty of the institution, including officers, number 74, and the total matriculation of students is 727.

VIRGIN'IA QUAIL, or Col'in: bird (*Ortyx Virginiana*) of family *Tetraonidæ*, abundant in N. America e. of the western plains; in some parts commongly known by the name of Quail, in others by that of Partridge. In size it is intermediate between the common quail and the common partridge of Britain. The prevalent color of the plumage is brownish red, underparts whitish; but all parts are more or less mottled with different colors. The feathers of the head are capable of being erected into a sort of crest. The call of the male is popularly regarded as resembling the words 'Bob White,' and this name is often given to it. The coveys of the Virginia Quail often

approach houses in winter, and mingle with domestic poultry. Great numbers are killed by guns and taken in snares; and in the western and southern states many hundreds were often caught in a day by parties of men on horseback, driving the coveys into a great cylindrical net. It has been introduced into some parts of Europe, and may almost be regarded as naturalized, though rare in England.—There are several species of allied genera in Mexico, California, and n.w. America, of which one, the CALIFORNIA QUAIL (*Lophortyx Californicus*), is remarkable for its long and beautiful black crest. See PARTRIDGE.

VIRGINIA REEL: a country-dance which can be danced by an indefinite number of couples, and probably an adaptation from the dance known as Sir Roger de Coverley.

VIRGINIA RESOLUTIONS, THE: in American history, a set of resolutions drawn up by James Madison in 1798. They were similar in import to the Kentucky resolutions drawn up the same year.

VIRGIN'IA SNAKE-ROOT. See ARISTOLOCHIA.

VIRGINIA, UNIVERSITY OF: the state university located at Charlottesville, Va. As early as 1779 Thomas Jefferson presented to the Virginia assembly his plan for public education, which included a university. This scheme was not, however, immediately carried out; and after 1814 Jefferson devoted himself largely to the work of founding a university in accordance with his ideal. It was finally established by act of the state legislature in 1819; and was first opened to students in 1825. From 1850 to 1861 was a time of especial prosperity and large attendance; during the war the college suffered a large loss of students, but nevertheless continued in session; after that its work continued successfully with gradually increasing attendance. In 1895 the Rotunda, Annex, and some adjacent smaller buildings were destroyed by fire, but the Rotunda, restored exactly and three other large buildings were formally opened in 1898. Since this several other important buildings have been added. The government of the university is vested in a board of visitors of nine members appointed by the governor with the approval of the senate for terms of four years. The students maintain an athletic association, having charge of athletic sports, two literary societies, several department and graduate societies, and a Young Men's Christian Association. This Christian Association, the first college association in America, is housed in a beautiful building, presented by Mrs. William E. Dodge, of New York. The original buildings of the university were planned by Jefferson and are purely classic in style; the more recent additions have been made to harmonize with and complete his plan. The central group encloses a quadrangle, 1,000 ft. in length and 300 ft. wide. The dominant structure

of this group is the Rotunda, the library building at the north end, modeled from the Roman Pantheon; other buildings around the quadrangle are the main academic building, the physical laboratory, the mechanical laboratory, and the original buildings designed by Jefferson. Parallel with the latter are the eastern and western 'ranges' of dormitories; outside the quadrangle group are the chapel, the natural history museum, the chemical laboratory, the medical building, the observatory, the infirmary, several dormitories, and the gymnasium. The campus also contains an athletic park, recently laid out, comprising 21 acres. Tuition in the academic and agricultural departments is free to Virginia students; the university awards scholarships to accredited schools; and there are several alumni scholarships, and a number of special scholarships. The general library contains over 50,000 volumes; and in addition there are law and other departmental libraries. The students number 660, of whom about half are in the academic department.

VIR'GIN ISLANDS: group of more than 50 islands in the West Indies, e. of Porto Rico; about 460 sq.m. Three of the islands, St. Thomas, St. Croix, and St. John, belong to Denmark; 240 sq.m.; pop. 30,527. The U. S. owns Vieque and Culebra (150 sq.m.), the former with pop. 6,000, the latter uninhabited. The others are British; about 70 sq.m.; pop. (1901) 4,908, of whom only about 150 are whites. The chief of the British Islands are Tortola, Virgin-Gorda and Anegada. The British possessions in the Virgin Islands form a district of the colony of the Leeward Islands, under a lieutenant governor, and are governed by an administrative council of 6 elective and 3 non-elective members. Revenue is about £700 per annum. The exports have average value nearly £3,300, imports about £3,200. The characteristic physical features are rugged heights and precipitous coast-lines, with numerous bays, havens, and creeks. Extensive tracts of land, possessed by the emancipated blacks, are covered with guinea-grass, good pasturage for cows, sheep and goats. A valuable mine of copper has been worked at Virgin-Gorda; and other valuable minerals have been found. Cotton, sugar, ginger, and indigo are principal products.—The Virgin Islands were discovered by Columbus on his second voyage, 1494. In the 17th century they were the favorite resort of the Buccaneers. Total population of group (1901) 28,894.

VIRGINIUS AFFAIR, The: It was in the harbor of Santiago de Cuba that the historic 'Virginius affair' occurred in 1873 which almost caused a war between the United States and Spain. The Virginius, a ship registered in the New York custom house 1870, Sept. 26, as the property of an American citizen, was captured on the high seas near Jamaica by the Spanish man-of-war Tornado, 1873, Oct. 31. The reason given was that she was

about to land men and arms in Cuba, which was then engaged in the 'Ten Years' War' against Spain. At the time of capture the Virginius was flying the American flag. She was taken to Santiago. President Grant remonstrated with the Spanish government, and through the United States minister to Spain, Gen. Daniel E. Sickles, demanded the release of the Virginius and her crew.

Spain was at that time a republic, under President Castelar, and while his government was asking for time to obtain information and was making promises, the authorities in Cuba determined to take matters into their own hands. In 1873, Nov. 7, the captain of the Virginius, Joseph Fry, and 36 of the crew, were shot. The next day 12 of the most prominent passengers were also shot. When the news of this action became known in the United States the excitement was intense. Meetings were held, and the bloody work was denounced. President Grant authorized the putting of the navy on a war footing, diplomatic relations were on the point of severance and war was imminent. Meanwhile President Castelar made the excuse that his orders to stay proceedings were received too late to prevent the crime.

Several times it seemed that hostilities could not be avoided. Once, Gen. Sickles sent for a ship to take him from Spain. At last, however, on Nov. 29, a protocol was signed between Secretary Fish and Admiral Polo, by which Spain agreed to surrender the survivors of the crew and passengers of the Virginius, together with the ship, and to salute the flag of the United States on Dec. 25. If, however, it should be proved in the interval that the Virginius had no right to fly the United States flag, the salute should be dispensed with, though Spain should disclaim any intention to insult the flag. Three days before the time agreed on, Secretary Fish announced himself as satisfied that the Virginius had no right to fly the flag, and the salute was dispensed with. On Jan. 23 Admiral Polo made the disclaimer agreed on. The Virginius was delivered to the United States navy at Bahia Honda on Dec. 16 with the American flag flying. She was, however, unseaworthy and, encountering a heavy storm off Cape Fear, sank. The prisoners who survived were surrendered on Dec. 18 at Santiago de Cuba, and landed in safety in New York.

VIR'GIN MARY. See MARY, THE BLESSED VIRGIN.

VIR'GIN'S BOWER. See CLEMATIS.

VIRGIN QUEEN, THE: a term popularly applied to Queen Elizabeth, on account of her determination not to marry.

VIRGO: the sixth sign of the Zodiac, and also the name of a constellation which formerly marked this sign, but is now in the sign Libra. It contains the bright star

Spica, and is on the meridian in the evenings of May and June. See ASTRONOMY.

VIRGULATE, a. *vėr'gū-lāt* [L. *virgŭla*, dim. of *virga*, a rod]: shaped like a rod or wand. VIRGULTUM, n. *vėr-gŭl'tŭm* [L.]: a long slender branch.

VIRIAL, n. *vĭr'ĭ-al:* in *physics*, the aggregate of the attractions of each pair of particles of a system of particles when the attraction of each is multiplied by the distance between the pair.

VIRIATHUS: Lusitanian patriot: d. 140 B.C. He was originally a herdsman, but became a leader in the ten years' struggle against the Roman power for about 151 B.C. He conducted a successful defense against the Roman army, defeating them repeatedly and finally hemmed in their forces and compelled the conclusion of a treaty of peace in order to save the army. The independence of Lusitania was acknowledged, and she became an ally of Rome, a treaty ratified by the Roman senate. In 140, however, Servilius Cæpio succeeded to the consulship in Further Spain, invaded Lusitania, and by bribery secured the murder of Viriathus, after which he conquered the country.

VIRIDITY, n. *vĭ-rĭd'ĭ-tĭ* [L. *viridĭtas*, greenness—from *vĭrĭdis*, green: It. *viridità*]: greenness; the color of fresh vegetables. VIRIDNESS, n. *vĭr'ĭd-nĕs*, greenness. VIRIDESCENCE, n. *vĭr-ĭ-dĕs'ĕns*, a being or becoming slightly green; greenish character, state, or appearance. VIRIDES'CENT, a. *-ĕnt*, slightly green; shading into green.

VIRILE, a. *vĭr'ĭl* or *-īl* [F. *viril*—from L. *virīlis*, male —from *vir*, a man: It. *virile*]: pertaining to a man in his mature state; not puerile or feminine. VIRILITY, n. *vĭ-rĭl'-ĭ-tĭ* [L. *virilĭtas*]: manhood; power of procreation; state and characteristic of the adult male. VIRILES'CENCE, n. *-ĕs'ĕns*, the assumption by an aged female of male characteristics. VIRILES'CENT, a. *-ĕs'ĕnt*, assuming male characteristics, as a hen past laying when she tries to crow, or develops plumage like that of a cock.

VIROLE, n. *vĭr'ōl* [F. *virole*, a ring]: a Ferrule (q.v); in *her.*, a hoop or ring; the mouthpiece of a bugle or hunting-horn.

VIROQUA, Wis: city, county-seat of Vernon co.; near the Kickapoo river, and on the Chicago, Milwaukee and Saint Paul railroad; about 85 m. n.w. of Madison and 25 m. s.e. of La Crosse. The city is in an agricultural and lumbering region, and is noted for the abundance of trout and game in the near vicinity. There are, each year, large shipments of grain, lumber products, farm products, and live stock. Pop. 2,000.

VIROSE. (See under VIRUS).

VIRTU, n. *vėr'tô* [It. *virtù*, worth]: artistic excellence, as in the phrase ARTICLES OF VIRTUE; spelled also VERTU. VIRTUOSO, n. *vėr'tū-ō'sō* [Lt., a person skilled in some

art]: one skilled in a knowledge of the fine arts, in antiquities, curiosities, and the like; plu. VIR'TUO'SI, *-sī*. VIR'TUOS'ITY, n. *-ŏs'ĭtĭ*, the class of virtuosi; exceptional skill in a fine art.

VIR'TUAL VELOC'ITY. See WORK.

VIRTUE, n. *vėr'tū* [L. *virtus* or *virtūtem*, bravery, moral perfection—from *vir*, a man: It. *virtù:* F. *vertu:* comp. Gael, *fear*, a man]: moral goodness or some particular moral goodness. (See ETHICS): that quality possessed by bodies by which they produce effects; inherent power; efficiency; medicinal quality or efficacy; legal efficacy; secret agency; excellence; right conduct; female chastity; in *OE.*, bravery; valor; the chief or essential element; one of the orders of the celestial hierarchy. VIR'TUELESS, a. *-lĕs*, having no virtue, efficacy, or value. VIR'TUAL, a. *-tū-ăl*, in effect though not in fact; having power of invisible efficacy without the material part. VIRTUALITY, n. *vėr-tū-ăl'ĭ-tĭ*, the state or quality of being virtual. VIR'TUALLY, ad. *-lĭ*, in efficacy or effect only. VIR'TUOUS, a. *-ŭs*, morally good; abstaining from vice; chaste, as a woman; in *OE.*, efficacious; powerful; courageous. VIR'TUOUSLY, ad. *-lĭ*. VIR'TUOUSNESS, n. *-nĕs*, the quality of being virtuous.

VIRULENT, a. *vĭr'û-lĕnt* [F. *virulent*—from L. *virulen'tus*, full of poison—from *vīrus*, a slimy liquid, poison: It. *virulento*]: very poisonous or venomous; bitter in enmity; malignant, as language. VIR'ULENTLY, ad. *-lĭ*. VIR'ULENCE, n. *-lĕns* [F.—L.], or, in *OE.*, VIR'ULENCY, n. *-lĕn-sĭ*, that quality which renders a thing extremely active in doing injury; extreme bitterness or malignity.

VIRUS, n. *vī'rŭs* [L. *vīrus*, poison]: contagious or poisonous matter of an ulcer or a pustule, etc.; material used for preventive inoculation, as vaccine virus; and foul hurtful matter; bitterness; malignity. VI'ROSE, a. *-rōs* [L. *vīrōsus*]: poisonous; in *bot.*, offensive in smell.—*Virus* is used in medicine to signify any one of those poisonous agencies which produce Zymotic Diseases (q.v.) such as smallpox, measles, scarlatina, the various forms of continued fever, ague, whooping-cough, cholera, syphilis, glanders, hydrophobia, etc. While each of these morbid poisons (as they were formerly called, though they are now known to be bacteria or protozoa) has a definite and specific action, they collectively obey certain laws—e.g., (1) Their actions are variously limited, some affecting only one organ or system of organs, others involving two or more organs or systems of organs. (2) Morbid poisons have their period of latency, which means that a definite time is required for the micro-organisms to multiply and reach a sufficient number to overcome the protective powers of the organism and produce symptoms of the disease. Thus the poisons of scarlatina, measles, and smallpox remain latent in the system for at least 7, 10, and 16 days respectively; while that of hydrophobia

may be dormant for an indefinite period. (3) When several tissues or organs are acted on, the actions may be simultaneous, but are usually consecutive, a considerable interval often elapsing between the attacks. (4) Two morbid poisons may co-exist in the same person, though this is not common in the case of the acute infectious diseases.

VIS, n. *vĭs* [L. *vis*, strength, force]: in *mech.*, force; power. VIS ACCELERATRIX, accelerating force. VIS-A-FRONTE, *vĭs-ă-frŏn'tĕ* [L., force from the front]: an attraction from the front. VIS-A-TERGO, *-tėr'gō* [L., force from the back]: a propulsion from behind. VIS'IMPRESSA, impressed force—that is, the force exerted as in moving a body or in changing its direction. VIS'INERTIÆ, *vĭs-ĭn-ėr'shĭ-ē* [L., strength of inactivity]: the power by which matter resists changes that are attempted to be made on its state; *fig.*, resistance offered by the innate inertness of persons, or their unwillingness to alter habits. VIS MEDICATRIX NATURÆ, in *therapeutics*, power which nature has (unaided by medicine) of effecting cures. VIS MORTUA, dead force; force doing no work, but merely producing pressure, as a body at rest. VIS NERVOSA, *nėr-vō'să* [L. *nervōsus*, nervous—from nervus, a nerve]: the property of nerves by which they convey stimuli to muscles either directly or circuitously. VIS VITÆ, *vī'tē* [L., force of life]: vital power or energy. VIS VIVA. See WORK.

VISA. See under VISÉ.

VISAGE, n. *vĭz'āj* [F. *visage;* It. *visaggio*, face—from L. *visus*, look, sight—from *vidērĕ*, to see]: the look; the face; the appearance; the countenance. VIS'AGED, a. *-ājd*, having a visage or countenance.

VISALIA, Cal.: city, county-seat of Tulare co.; on the Kaweah river, and on the Visalia and Tulare railroad; about 40 m., in direct line, s. of Fresno and 10 m. n. by e. of Tulare. It was settled about 1850, laid out as a town in 1852, incorporated in 1874. It was made the county-seat in 1853. It is in an agricultural region, and the chief manufactures are canned fruits. There are extensive shipments of farm products, fruit, and canned goods. The city has three state banks having a combined capital of $250,000 and deposits amounting to $929,730. Pop. 3,150.

VISARD, n. *vĭz'ėrd* [see VISOR]: a mask: V. to mask.

VISAYAN, *vē-sâ'yân* ISLANDS, or VISAYAS: the central and largest group of the Philippine Archipelago, lying between lat. 9° 2′ and 13° 5′ n., and between long. 121° 49′ and 125° 51′ e.; n. of Luzon, and s. of Mindanao; land area, 23,502 sq.m.; total area, 77,840 sq.m. It consists of the islands of Bohol, Cebú, Leyte, Masbate, Negros, Panay, Romblón and Samar and their dependent islands, numbering in all 490. Many of the dependent

islands are of geographical and commercial importance; chief among them are Lapenin Grande and Panglao (belonging to Bohol), Mactan (Cebú), Bilarian and Panaõn (Lyte), and Guimaras (Panay). The staple products hemp, sugar, tobacco, coffee, rice, cotton, corn, and cocoa, of the archipelago are cultivated, the production of hemp being especially important in Cebú, Leyte and Samar. All the islands are well wooded; the best varieties of hardwoods grow in abundance, and many resin and gum trees. The mineral wealth is also of importance, the first coal discovered in the Philippines having been found in Cebú. Gold, silver, iron, and copper are also found; though these are mined to some extent, the mineral resources are by no means fully exploited. The mechanical industries of these islands include sugar manufacture, weaving, the making of sugar sacks, and cheese-making (in Cebú). Stock-raising and the trepang, pearl shell and pearl fisheries are also important industries. There is a large export trade in the products of agriculture, the manufactures, and the fisheries. The land transportation facilities are especially good in Bohol, Cebú, Leyte, Negros, and the province of Iloilo, Panay. See also the names of the more important islands comprising the group.

VIS-À-VIS, n. *vĭz'â-vē* [F., face to face, opposite]: one who or that which is face to face with another; a carriage in which two persons sit face to face; a sociable: AD. face to face.

VISAYAS, *vē-sä'yäs,* or BISAYAS: a Malay people of the Philippine Islands, inhabiting the Visayan Islands, and the northern and eastern coast of Mindanao. At the time of the arrival of the Spaniards they had a written language and considerable culture of their own; they practiced the custom of tattooing, and were therefore called by the Spaniards *Pintados* (painted men). They were easily Christianized, and joined with the Spaniards in helping to subdue the Tagals. They are a docile and industrious people; particularly the inhabitants of Bohol are good mechanics, and for their success in trade have gained the name of the 'Chinese of the Philippines.' Their language shows a large variety of dialects, of which the most important are the Cebuano and Panayano.

VISCACH'A: the *Lagostomus trichodactylus*, a stout rodent belonging to the family *Chinchillidæ* and resembling a marmot. It is from 18 in. to 2 ft. long, exclusive of the tail, which measures from 6 to 8 in. The fur is mottled gray above, yellowish-white beneath; a dark band on each cheek, a white band on muzzle, running back on each side almost as far as the eye. Viscachas are nocturnal, live in communities, and resemble rabbits in their habits, but are less active. They are found on the pampas, from Buenos Ayres to Patagonia. These animals have the strange habit of dragging all

sorts of hard and apparently useless objects to the mouth of their burrow, where bones, stones, thistle stalks, and lumps of earth may be found collected into a large heap, sufficient, according to Darwin, to fill a wheelbarrow. They form the principal food of the wolves, pumas and jaguars of their country.

VISCELLI'NUS, SPURIUS CASSIUS: first Roman agrarian agitator. He was victorious over the Sabines as consul (502 B.C.) and in his second consulship (493) made a treaty with the Latins, which was advantageous to both parties. In his third consulship (486) he proposed a measure by which the plebeians should have a share in the *ager publicus*. The patricians immediately accused him of making favor with the commons in order that by them he might be chosen king and set on the throne of the recently expelled Tarquins. He was condemned to be thrown from the Tarpeian rock, in the execution of which sentence his own father took part.

VISCERA, n. plu. *vĭs'sĕr-ă* [L. *viscus*, plu. *viscĕra*, the entrails]: the bowels; the contents of the four great cavities of the body—the abdomen, thorax, cranium, and pelvis. VIS'CERAL, a. *-ăl*, pertaining to the viscera. VIS'CERATE, v. *-āt*, to eviscerate; to disembowel. VISCERALGIA, n. *vĭs'ĕr-ăl'jĭ-a* [from *viscera*, and Gr. *algos*, pain]: pain in the viscera; neuralgia of the abdominal viscera. VISCERIMOTOR, a. *vĭs'ĕ-rĭ-mō'tŏr*, conveying motor influence to one of the viscera—applied to a nerve. VISCEROSKELETAL, a. *vĭs'ĕr-ō-skĕl'ĕ-tăl*, of or pertaining to the skeleton of the visceral cavities. VIS'CUS, n. *-kŭs*, in *anat.*, one of the organs, as the brain, the heart, the liver, and the spleen, contained within the four great cavities of the body.

VISCHER, PETER: German sculptor: b. Nuremberg 1455; d. there 1529. He was invited by Philip Elector Palatine to Heidelberg, but soon returned to Nuremberg, where he executed a great many works with the assistance of his five sons. Among his most celebrated works, whose architectural parts combine Gothic with Renaissance features, while his figures have all the realism of the Renaissance, may be mentioned: *The Tomb of Bishop John IV.* in the cathedral at Breslau (1496); the *Tomb of Archbishop Ernest* in the cathedral at Madgeburg (1497); the *Tomb of St. Sebaldus* in the church of that dedication at Nuremberg; and the *Tomb of Eitel-Friedrich II. von Zollern and of his wife in the church at Heckingen;* etc.

VISCID, a. *vĭs'sĭd* [mid. L. *viscĭdus*, clammy—from L. *viscum*, the mistletoe, bird-lime made from the mistletoe: It. *viscido*, glutinous]: glutinous; sticky; tenacious. VISCIDITY, n. *vĭs-sĭd'ĭ-tĭ*, tenacity; stickiness. VISCOUS, a. *vĭs'kŭs*, glutinous; sticky; adhesive. VISCOSITY, n. *vĭs-kŏs'ĭ-tĭ*, tenacity; stickiness; also VIS'COUSNESS, n. *-nĕs*. VIS'CIN, n. *-sĭn*, the glutinous constituent of the mistletoe.

VISCONTI: an old Milanese family, celebrated for its political consequence and its patronage of science. History makes mention of the Visconti in the 11th century; but they disappear from the time of the destruction of Milan by Frederick Barbarossa, when, with some other noble families, they were obliged to yield to the superior power of the opposite party, the Torriani or family Della Torre. The first of the Visconti who laid the foundation of their greatness was OTTONE: b. 1208; d. 1295, created archbishop of Milan in 1263, and perpetual lord of Milan in 1277, who gained the ascendency over his enemies, and bequeathed his power to his nephew, MATTEO: b. 1250; d. 1322. The latter was, however, driven into banishment by the Torriani, but after living in exile seven years, had the address to obtain the title of imperial vicar 1294, which he soon exchanged for that of lord-general of Milan (1311). Matteo transmitted the supreme power to his eldest son, GALEAZZO: b. 1277; d. 1328, Aug. 6, who was overpowered by his enemies and thrown into prison by Louis of Bavaria in 1327, but was soon after released. His son, AZZO: b. 1302; d. 1329, Aug. 14, who succeeded him and increased the extent of his dominions, acquiring nearly all of Lombardy, was not less distinguished for his pacific virtues than for his military talents. His uncle, LUCCHINO: b. about 1287; d. 1349, Jan. 24, succeeded him. The latter extended the dominions of the family, and was the first of the name who was distinguished as a patron of science and art. He corresponded with Petrarch. After his death in 1349 his brother, GIOVANNI: b. 1290; d. 1354, Oct. 5, archbishop of Milan, assumed the reins of government. He was a zealous patron of letters. He appointed a commission of six learned men to compose a commentary on Dante, fostered the University of Bologna, and received Petrarch on his arrival at Milan with the highest marks of distinction. Giovanni was succeeded by his nephews, MATTEO II., d. 1355; BARNABO, d. 1385; and GALEAZZO II., d. 1378. Matteo's two brothers, who shared their estates on his death, though eminent for their warlike talents, rendered themselves obnoxious by their cruelty and other vices. Galeazzo, however, continued to treat Petrarch with the same respect that his predecessors had shown him, and employed him in several negotiations. He was succeeded in 1378 by his son, GIAN GALEAZZO: b. about 1347; d. 1402, Sept. 3, who imprisoned his uncle Barnabo in the castle of Trezzo, and took upon himself the sole government (1385). In him the Visconti family reached the summit of its grandeur and splendor. In 1395 he received from the Emperor Wenceslas the ducal dignity; and his territories were more extensive than those of any of his predecessors. Pisa, Siena, Perugia, Padua, and Bologna were subject to his sceptre; and he had already shown a disposition to assume the title of king of Italy, when his ambitious projects were cut short

by his death of the plague. He fostered science and art, collected the most distinguished scholars at his court, restored the University of Piacenza, and connected that of Pavia with it, and founded a large library. He built the celebrated bridge over the Ticino at Pavia, and began the magnificent cathedral at Milan. Gian Galeazzo left three sons, GIAMMARIA, d. 1412, May 16; FILIPPO MARIA, d. 1447, Aug. 13; and an illegitimate child, GABRIEL, d. 1408, Sept. Giammaria succeeded to the dukedom, and was assassinated, after which Filippo Maria reigned alone till his death. His natural daughter, Bianca, had been married to Francesco Sforza, who was named duke of Milan in 1450.

VISCON'TI, ENNIO-QUIRINO: one of a distinguished family of archæologists and architects: 1751, Nov. 1—1818, Feb.; b. Rome; eldest son of GIOVANNI BATTISTA VISCONTI, a native of Sarzana, who settled at Rome, succeeded Winckelmann as prefect of the antiquities of Rome, and d. 1784. The young Visconti was educated by his father for the priesthood, but this profession he afterward refused. He was appointed conservator of the Capitoline Museum at Rome; and had gained a European reputation as archæologist, when the arrival of the Neapolitan army caused him to emigrate to Paris, where he was made an administrator of the Louvre, and professor of archæology. In 1804 he prepared, at Napoleon's request, a series of portraits of the distinguished men of ancient Greece and Rome (perhaps the greatest of his works), *Iconographie Grecque* (3 vols. 4to, 1808), and *Iconographie Romaine* (1 vol. 4to, 1817). He issued also many dissertations (with illustrations) on ancient art. Besides his immense antiquarian knowledge, Visconti had extensive acquaintance with the history, languages, mythology, and manners of the classic age.—His younger brother, FILIPPO AURELIO VISCONTI (died at Rome 1830), also was an eminent archæologist, president of the commission of antiquities and fine arts at Rome 1809-14.—LOUIS-JOACHIM VISCONTI, son of Ennio-Quirino Visconti (1797-1853, b. Rome, d. Paris), was one of the official architects and surveyors of Paris, and architect of the Bibliothèque Royale 1825. His designs include some of the first fountains of Paris, the tomb of Napoleon I., and many public and private buildings—the chief being the plans for the completion of the Louvre on a magnificent scale.—Louis-Joachim's nephew, PIERRE-HERCULES VISCONTI, celebrated archæologist, became professor of archæology in the National Academy of France, at Rome.

VISCOS'ITY: is that property of matter by virtue of which resistance to change of shape depends on the rapidity of the change. All substances, ranging from gases to solids, are supposed to possess this property in a greater or less degree. A noteworthy instance of viscosity is exhibited by sealing wax; for while it is

quite rigid in resisting forces quickly applied, it will change shape greatly under the acton of a small force (its own weight, for example) applied continuously for a long time. Molasses, tar, asphalt, and many other like substances, also illustrate this property in a striking way; while water, alcohol, air, and other liquids and gases, as shown by suitable experiments, possess the same property in a less degree. The viscosity of a medium is measured by the quotient of the tangenital stress developed along any plane in the medium, by relative motion of its parts, divided by the rate at which the velocity of the medium is changing with distance perpendicular to that plane.

VISCOUNT: a British title of nobility, next in rank to that of earl, and immediately above that of baron. It was first conferred by letters patent on John, Lord Beaumont, by Henry VI. in 1440. The title is frequently attached to an earldom as a second title, and is held by the eldest son during the lifetime of the father.

VISCUS. See under VISCERA.

VISE, n. *vīs* [OF. *vis*, a screw, a winding stair; from L. *vitis*, a vine]: a spiral or corkscrew staircase, the form most generally used in mediæval buildings in which the steps wind round, and rest at one end on a perpendicular pillar called the Newel, and at the other end rest in the wall; the newel itself: in *mechanics*, a gripping appliance of wood or iron, consisting essentially of two movable jaws moved by a screw, and used to hold an object in place while work is being performed on it: it may be either portable, or fixed to a work-bench.

VISÉ, n. *vē'zā*, or VISA, n. *vē'să* [F. *visé*, pp. of *viser*, to put one's visa to—from L. *visus*, pp. of *vidērĕ*, to see]: indorsement made on a passport or the like, denoting that it has been examined by the proper authorities to show that it is in order; official indorsement: V. to examine and indorse, as a passport. VI'SÉING, imp. *-ĭng*. VI'SÉED, pp. *-zād*. Also spelled VI'SA, VI'SAING, VI'SAED.

VISEU, *vē'sā-ô:* city of Portugal, province of Beira; in a wide, fruit-producing plain, 1,300 ft. above sea-level; 50 m. n.e. of Coimbra. Its cathedral is a striking flamboyant edifice, and contains excellent pictures by Gran Vasco, the Portuguese Fra Angelico. In the vicinity is the old Roman camp, Cava de Viriato. The town, one of the oldest in the country, contains other Roman as well as Gothic and Moorish remains. A large fair is held here. Pop. 8,000.

VISHNI-VOLOTCHOK, *vĭsh'nī-vō-lō-chōk':* town of Russia, government of Tver; on the river Tzna; about 230 m. s.e. of St. Petersburg by railway. It is on the Vishni-Volotchok water-route constructed by Peter the Great, connecting the navigation of the Baltic and Caspian seas by means of the Volga, etc. There is a very extensive transit-trade. Pop. 16,000.

VISHN'U, n. *vĭsh'nô* [Skr. *Vishnu*—from *vish*, to pervade, to extend through nature]: a Hindu divinity regarded as the 'preserver,' the second of the Hindu Trimûrti (q.v.), but considered by his worshippers to be the supreme deity of the Hindu Pantheon (see VAISHN'AVAS: also INDIA—*Religion*). In the R'igveda, V. represents the sun, who 'strides through the seven regions of the earth,' and 'in three ways plants his step' (or, as Yâska explains, plants his steps so as to become threefold). And, according to one predecessor of Yâska, these three steps mean the manifestation of the sun at its place of rising, on the meridian, and at its place of setting; or, according to another, its manifestation on earth, in the intermediate space, and in heaven; when—as a later commentator observes—in the first of these manifestations, V. represents fire; in the second, lightning; and in the third, the solar light. From this position which V. holds in the R'igveda (see VEDA), it results that he was not regarded there as supreme, or even as equal to other deities who at the Vedic period occupied a foremost rank. He is extolled in several hymns as having 'established the heavens and the earth,' as 'being beyond mortal comprehension,' etc.; but he is there described also as having derived his power of striding over the world from *Indra* (q.v.), and as celebrating the praises of this god. He is frequently invoked together with the latter, but apparently always as inferior to him; and often, too, he occurs in company with a number of other gods, such as Varun'a, the Maruts, Rudra, Vâyu, the luminous deities called *Adityas*, and others, with no distinction in their respective rank. Fewer hymns, moreover, are separately devoted to his praise than to that of Agni, Indra, or other prominent gods of the Vedic period; and it deserves notice, too, that at that period he was not yet included among the Adityas, for only at the epic period—when the number of these deities, originally varying from six to eight, was raised to twelve—V. was included in it—he then being named as the foremost of these luminous offsprings of Aditi, or space.

Although some of the Brâhman'as of the Vedas (q.v.) already show the progress which the solar V. had made in the imagination of the people, and though they contain the germ of several legends which at a later time became fully developed, the really mythological character of this god, as the basis of the divine worship now paid him by a large class of the Hindu population, belongs to the epic poems—the *Râmâyan'a* and *Mahâbhârata* (q.v.)—and to the *Purân'as* (q.v.). In the Mahâbhârata, V. is often identified with the supreme spirit; but while in some portions of this poem—the different parts of which belong to different epochs of Hindu antiquity—he is thus regarded as the most exalted deity, he is in others represented as paying homage to S'iva (q.v.), the third of the Trimûrti. Taking, therefore, the Mahâbhârata as a whole, he does not occupy, in this epos, the exclusive supremacy which is assigned to him in the Râmâyan'a, and still more in those Purân'as especially devoted to his praise.

VISHN'U.

The large circle of myths relating to V., in the epic poems and Purâṇ'as, is distinguished by a feature which, though not quite absent from the mythological history of S'iva, especially characterizes that of Vishn'u. It arose from the idea that whenever a great disorder, physical or moral, disturbed the world, V. descended 'in a small portion of his essence' to set it right, to restore the law, and thus to preserve creation. Such descents of the god are called his *Avatâras* [from *ava* and *tr'î*, descend]; and they consist in V.'s being supposed to have either assumed the form of some wonderful animal or superhuman being, or to have been born of human parents, in a human form, always, of course, possessed of miraculous properties. Some of these Avatâras are of entirely cosmical character; others are probably based on historical events, the leading personage of which was gradually endowed with divine attributes, until he was regarded as the incarnation of the deity itself. Except the last, all these Avatâras belong to the past; the last is yet to come. Their number as usually received is 10, and their names in the following order: 1, the fish-; 2, the tortoise-; 3, the boar-; 4, the man-lion-; 5, the dwarf-; 6, the Paras'u-Râma-; 7, the Râmachandra, or, briefly, Râma-; 8, the Kr'ishn'a- and Balarâma-; 9, the Buddha-; 10, the Kalki- or Kalkin-Avatâra. This number and enumeration of Avatâras, however, has not been at all times the same. The Mahâbhârata, though also mentioning 10, gives a somewhat different succession. The Bhâgavata-Purâṇ'a speaks of 22; and other works have 24 Avatâras, or even call them numberless.

1. The *Matsya-* or *fish-Avatâra*.—When, at the end of the last mundane age (the Bhâgavata-Purâṇ'a relates), Brahman, the first god of the Trimûrti, had fallen asleep, a powerful demon, *Hayagrîva*, stole the Vedas (see VEDA) which had issued from the mouth of Brahman and lay by his side. About that time, a royal saint, *Satyavrata*, had by his penance attained the rank of a Manu; and V., who had witnessed the theft by Hayagrîva, and intended to slay him, assumed for this purpose the form of a very small fish, and glided into the hands of the saint when the latter made his daily ablutions in the river. Manu (the saint), about to release the little fish, was asked by it not to expose it to destruction by the larger fish in the river, but to place it in his water-jar. The saint complied; but in one night the fish grew so large that, at its request, he had to transfer it to a pond. Soon the pond also becoming insufficient, Manu had to choose a larger pond for it; and, after other changes, he took it to the ocean. Satyavrata (the saint) now understood that the fish was no other than *Nârâyan'a* or V.; and, after he had paid his adoration to the god, the latter revealed to him the imminence of a deluge which would destroy the world, and told him that a large vessel would appear to him, in which he was to embark with the seven Rishis, taking with him all the plants and all the seeds of created things. Manu obeyed the behest of the god; and when the water covered the surface of the earth, V. again appeared to him in the

shape of a golden fish with a single horn—the fish being 10,000 miles long; and to this horn Manu attached the vessel, by means of V.'s serpent, which served as a cord. While floating in the vessel, Manu was instructed by the fish-god in the philosophical doctrines and in the science of the supreme spirit; and after the deluge had subsided, the fish-god killed Hayagrîva, restored the Vedas to Brahman, and taught them to the Manu Satyavrata, who in the present mundane age was born under the name of *S'râddhadeva*, as the son of Vivasvat.—A fuller account of this Avatâra and of the gods is in the *Matsya-Purân'a*—the fish-god's instructions including all the detail usual in a Purân'a (q.v.), relative to creation, the patriarchs, progenitors, regal dynasties, the duties of the different orders, etc. In the Mahâbhârata the same legend occurs with many variations, of which an important one is that the fish is a personification not of V., but of Brahman; and that the deluge occurs in the present mundane age.

2. The *Kûrma-* or *tortoise-Avatâra.*— When, of old, the gods felt their powers impaired, and were desirous of obtaining *Amr'ita*, the beverage of immortality, V. directed them, together with the demons, to churn the milk-sea, by taking the mountain *Mandara* for their staff; while he himself consented to support the mountain on his back, after having assumed the shape of a gigantic tortoise. One result of this churning of the sea of milk was a violent contest between the gods and demons, in which the demons were defeated: see RÂHU.—The legend on which the tortoise Avatâra of V. is based seems to belong entirely to the post-Vedic period of Hinduism.

3. The *Varâha-* or *boar-Avatâra.*—This is supposed to have taken place when, at the period of creation, the earth was immersed in water, and V., in order to raise it up, assumed the form of a gigantic boar. In the earlier recension of the *Râmâyan'a* and the *Linga-Purân'a*, it was Brahman, creator of the universe, who transformed himself into a boar to rescue the earth from its imperilled position: at a later period, this Avatâra is generally attributed to Vishn'u. Between both conceptions there is this great difference, that in the former the transformation of the deity into a boar has apparently a purely cosmical character; whereas in the latter 'it allegorically represents the extrication of the world from a deluge of iniquity, by the rites of religion.' (Wilson's translation of the *Vishn'u-Purân'a*, 2d ed., I. 59, note.) From other forms of this legend in the *Bhâgavata-Purân'a*, and in one of the later portions of the Mahâbhârata, it is evident that the boar-Avatâra had gradually lost its original character, and assumed that common to the remaining Avatâras, of representing the deity as become incarnate to remedy moral or religious wrong, or to destroy influences hostile to the pretensions of the Brâhmanic caste.

4. The *Nr'isinha-* or *man-lion-Avatâra.*—The demon *Hiran'yakas'ipu* had resolved to become a sovereign of the three worlds, and exempt from death and decay. To attain this end, he practiced severe austerities, and ulti-

nately received from Brahman, as the reward, a promise that he should become a supreme ruler, and death should not accrue to him from any created being, neither within his abode nor without, neither by day nor by night, neither in heaven nor on earth, nor by any kind of weapon. Possessed of this boon, he oppressed all the gods, robbed them of their shares in the sacrifices, and threatened their destruction. But he had a son, *Prahrâda* or *Prahlâda*, who had become a devout worshipper of Vishn'u: wherefore he resolved to kill this son, and was about to cut off his head, when V. suddenly appeared as a being neither man nor animal, but a man-lion of fearful aspect and size; and, after a violent struggle with the demon, killed him by tearing his heart out with his finger-nails. The son was then installed by V. as sovereign over the demons.

5. The *Vâmana-* or *dwarf-Avatâra.*—Prahlâda (above mentioned) had a grandson, *Bali*, who, having conquered Indra (q.v.), ruled over the three worlds, and filled the gods with dismay for their future. They had recourse to V., who, assuming the shape of a dwarf, humbly approached the demon king, and asked for so much ground as he could measure with three paces—a modest request which the king smilingly granted. But the dwarf strode with one pace over the earth, with a second over the intermediate space (the atmosphere), and with a third over the sky, leaving for Bali only the subterranean regions.—The Vedic conception of the three strides of V., mentioned in the beginning of this article, is doubtless the basis of this Avatâra.

6. The *Paras'u-Râma-Avatâra*, or V.'s incarnation as Râma, son of Jamadagni, armed with an ax (*paras'u*).—*Arjuna*, son of *Kr'itavîrya*, and king of the Haihayas, had obtained, as a reward for his piety, a thousand arms, and the sovereignty over the earth. The gods, frightened at his power, had recourse to V., who resolved to be born as a son of Jamadagni, that he might slay him. Arjuna came to the hermitage of Jamadagni, and was hospitably received by the saint, who could treat him and his followers sumptuously, as he possessed a wonderful cow of plenty, that supplied him not merely with the milk and butter required for his sacrificial offerings, but with everything else that he wished for. In spite of the kind treatment he had met. Arjuna carried off with him the cow and her calf. When Râma (V. incarnate in this form), who, on this occasion, had been absent from home, returned to his father's hermitage, and learned what had happened, he took up his ax (or his bow) and slew Arjuna, together with his army. The sons of Arjuna, to revenge his death, attacked the hermitage and killed Jamadagni: thereupon Râma made a vow to extirpate the whole Kshattriya or military race; and in fulfilling this vow killed the men of many generations as fast as they grew to adolescence, 'and filled with their blood the five large lakes of Samantapanchaka.' There can be little doubt that a historical conflict between the Brâhman'as and Kshattriyas or military caste underlies the conception of this Avatâra—one which has its parallel in the history of Vasisht'ha and Vis'wâmitra (q.v.).

7. The *Râmachandra-*, or, briefly, *Râma-Avatâra.—Râvan'a*, King of *Lankâ*, or Ceylon, a monster with ten heads and twenty arms, had, by dint of austerities, obtained from Brahman the promise that neither gods nor demons should be able to take his life. In consequence, he oppressed the whole universe: the sun dared not shine hot, or the fire burn, or the wind blow, where he stood; and the ocean, when it saw him, became motionless. The gods, thus seeing the world and their own existence endangered, implored Brahman to protect them; and he, remembering that the demon, when asking for the boon that he had granted him, omitted to include men among the beings that should not hurt him, advised the gods to pray to V. to become incarnate. This they did, and V. granted their

Agni. Sîtâ. Hanumat. Râma.

Fig. 1.—Sîtâ is seen undergoing the fire-ordeal, to satisfy the world of her chaste escape from the power of Râvan'a, comforted by the presence of Agni, the god of fire.—From Moor's *Hindu Pantheon.*

prayer: he became incarnate by birth from the three wives of *Das'aratha*, a king of Ayodhyâ, the solar line of Hindu kings—*Râma*, the son of one wife, becoming one-half of the substance of V.; the twin sons of another wife, becoming together one-fourth; and the son of the third wife one-fourth. Râma and his brothers performed all manner of wonderful exploits, which the legends recount in minute detail. By intrigue, Râma's father, in a moment of weakness, was persuaded to banish him to the forest for 14 years. This long exile of Râma, shared by his faithful brother Lakshman'a, was full of wonderful events leading to the destruction of the demon Râvan'a. They began with a series of conflicts which he had to sustain with the Râkshasas, who infested his forest abode, and which invariably ended in the destruction of these beings. Râvan'a's sister was one of these demons; and having fallen in love with Râma and being repelled by him, she, after much intrigue, persuaded her brother to carry off Râma's wife Sîtâ to his capital. Râma discovered his wife's fate, and attacked, conquered, and destroyed the demon—thus achieving the object of his 7th Avatâra. Some of the incidents of this struggle are the basis of traditions still prevalent in India—relating to the allies of Râma: these allies were miraculous bears and monkeys, which by their magic

powers mainly brought about the defeat of Râvan'a and his armies, while also helping Râma to communicate with Sîtâ during her captivity. All these bears and monkeys were of divine origin, produced at the behest of Brahman by the gods for the purpose of becoming the allies of Râma: the most renowned of all, *Hanumat*, was a son of Wind: see HANUMÂN. At the end of this fierce war, Râma's exile ended, he returned to Ayodhyâ with Sîtâ, and there received back the sovereign power; and at the end of a long and glorious reign he became reunited with the splendor of Vishn'u. The story of this incarnation is briefly told in an episode of the Mahâbhârata (q.v.), and in several Purân'as; with the fullest detail in the *Râmâyan'a* (q.v.). See SANSKRIT LITERATURE: also, 'Analysis of the Râmâyan'a,' in Prof. Monier Williams's *Indian Epic Poetry*.

8. The *Kr'ishn'a-Avatâra* and *Balarâma-Avatâra*.—The former of these two, which are generally treated as one, is the most interesting incarnation of V., both for the opportunity which it affords to trace, in Hindu antiquity, the gradual transformation of mortal heroes into representatives of a god, and for the numerous legends connected with it, as well as for its influence on the Vaishn'ava cult (see VAISHN'AVAS). In the Mahâbhârata (as Dr. Muir has shown in his *Original Sanscrit Texts*, vol. IV.), Kr'ishn'a is represented sometimes as rendering homage to S'iva (q.v.), and therefore acknowledging his own inferiority, or as recommending the worship of Umâ (q.v.), consort of S'iva. In some other passages he bears merely the character of a hero endowed with extraordinary powers. As the intimate ally of the Pân'du prince Arjuna (see PÂN'DAVAS), he claims the rank of the supreme deity; but there are passages in the Mahâbhârata in which the same claim of S'iva is admitted. Sometimes, moreover, in this epos Kr'ishn'a is declared to represent merely a very small portion—'a portion of a portion'—of the divine essence of Vishn'u. In the Mahâbhârata, therefore, the worship of V. in this incarnation was not generally admitted (as it is in many Purân'as of the Vishn'uit sect); nor was there, in the epic period, that consistency in the conception of a Kr'ishn'a-Avatâra traceable in the later works.—Space is lacking here for even an outline of the complex and interwoven legends of Kr'ishn'a as he appears in the Harivans'a (q.v.) and the Purân'as (q.v.). They start with the complaint of the Earth to the assembled gods concerning the frightful oppressions of the demon king *Kansa* (one of the lunar line of kings), which caused Brahman to pray to V. to relieve the distress. V. thereupon caused two of his hairs to become impersonated by birth as *Balarâma* and *Kr'ishn'a*, sons of Devakî, who in a former life had been Aditi (space personified). After many contests and intrigues of the demons, and many miraculous feats, Kr'ishn'a killed the demon king Kansa. One of his feats, especially commemorated by his worshippers, is the following, in which Balarâma always figures as the friend and ally of his more important brother, Kr'ishn'a: When sporting in Vraja, he found the cow-herds preparing for a sacrifice to be offered

to Indra (q v.); and he dissuaded them from worshipping this god, and directed them to address prayers and offerings to the mountain *Govardhana.* Indra, offended sent a heavy storm, which inundated the country, and threatened to destroy the cattle: thereupon Kr ishn a plucked up the mountain Govardhana from its base, and held it up through seven days and nights as a large umbrella over the cow-pens, to shelter the herdsmen and their cattle from the storm; till Indra at last came to Govardhana, and worshipped Kr'ishn'a. The episode in the life of Kr'ishn'a which now ensued, and is filled with his pleasures and sports among the Gopîs, or cow-herdesses, is commemorated in an annual festival in various parts of India (Oct.—Nov.), and dwelt upon in many poetical works. Of these cow-herdesses, later poets especially mention *Râdhâ;* and she is sometimes represented also as the divine or mystical love to which Kr'ishn'a returns at the end of his more worldly amours (see JAYADEVA). Later performances (but after Kansa's death) in the same line were his marriage of *Revatî;* his violent abduction of *Rukmin'i,* daughter of a king of Vidarbha, who had been betrothed to *S'is upâla* (q.v.)—which occasioned a fierce war; and his marriage to 16,100 maidens, whom he had rescued from *Naraka.* In other wars, Kr'ishn'a fought against S'iva (q v.); and on the side of the Pân'd'us in their war with the Kurus (see MAHÂBHÂRATA). —For the Avatâra of V. as Balarâma, see YAMUNÂ.

Fig. 2.—Vishn'u as Nârâyan'a.—From Moor's *Hindu Pantheon.*

9. The *Buddha-Avatâra,* or V.'s manifestation as Buddha.—This is originally foreign to the cycle of the Avatâras of V., and therefore only briefly alluded to in some Purân'as—with the intention, doubtless, to effect a compromise between Brahmanism and Buddhism, by trying to represent the latter religion as not irreconcilably antagonistic to the former See BUDDHISM.

10. The *Kalki-* or *Kalkin-Avatâra.*—This is yet to come, 'when the practices taught by the Vedas, and the institutes of the law, shall have ceased, and the close of the Kali or present age shall be nigh.' V. will then be born 'in the

family of *Vishn'uyas'as* (possessing the glory of Vishn'u), an eminent Brahman of Sambhala village, endowed with the eight superhuman faculties. He will then destroy all the barbarians and thieves, and all whose minds are devoted to iniquity.'—*Vishn'u-Purân'a.*

V.'s wife is *S'rî*, or *Lakshmî* (q.v.), and his paradise *Vaikunt'ha.* When represented, he is of dark hue, with four hands, in which he holds a conch-shell, blown in battle, the *Pânchajanya;* a disk, the *Sudars'ana*, emblem of sovereign power; a mace, the *Kaumodakî*, as a symbol of punishment; and either a lotus, as a type of creative power, or a sword, the *Nandaka.* On his breast shines the jewel *Kaustubha.* He is variously represented—e.g., sometimes as *Nârâyan'a* (see the first Avatâra) when floating on the primeval waters, and resting on *S'esha*, his serpent of infinity; and there are numerous other forms.—V. is praised under a thousand names, enumerated in the *Mahâbhârata*, and commented on by S'ankara and other authors.—For other myths relating to V., consult H. H. Wilson's transl. of the *Vishn'u-Purân'a*, re-edited by Fitzedward Hall (5 vols., with index, Lond. 1864–76); the first nine books of *Le Bhâgavata-Purân'a*, traduit et publié par Eugène Burnouf, I.–III. (Paris 1840–47); *Harivans'a*, traduit par A. Langlois, vols. I., II. (Paris 1834–5); and vols. I. and IV. of John Muir's *Original Sanscrit Texts* (Lond. 1858, 1863).

VISHN'U PURÂN'A: see PURÂN'A.

VISIBLE, a. *vĭz'ĭ-bl* [F. *visible*—from L. *visibilis*, visible—from *visus*, pp. of *vidērĕ*, to see: It. *visibile*]: that may be seen; perceivable by the eye; apparent; conspicuous. VIS'IBLY, ad. *-blĭ.* VIS'IBLENESS, n. *-bl-nĕs*, or VIS'IBIL'ITY, n. *-bĭl'ĭ-tĭ*, state or quality of being visible or perceptible; state of being apparent. VISIBLE CHURCH, the whole body of professed believers in Christ.

VISIBLE SPEECH: system of alphabetic characters, each of which represents the configuration of the mouth which produces the sound. The system is the invention of Alexander Melville Bell (q.v.), formerly prof. of elocution in University College, London; and was published 1867, under the title *Visible Speech.* While the system has not the absolute perfection attributed to it by its inventor, it was an immense advance on any previous phonological analysis. It is indeed a *new instrument* placed in the hand of the student of phonetics.

In the system of notation the letters are formed by the combination of about 30 radical symbols, most of which are to a certain extent pictorial of the action of the organs which produce the sound. Thus a simple circle O represents breath issuing from the *open* throat (aspiration); while the *narrowing* of the glottis which produces vocal murmur is symbolized by |, from which, by modifiers to indicate guttural, palatal, 'primary,' 'wide,' etc., all the vowel-symbols are formed. Contraction in the mouth is indicated by a C, and the *part* of the mouth in which the contraction takes place is shown by the direction in which the symbol is turned—thus, C denotes contraction in the

back of the mouth (Scotch and German *ch* in *loch*), ↄ denotes lip-contraction. Complete stoppage is indicated by drawing a line across the opening, giving a symbol resembling D, which turned this way would represent the sound of *p*, while ᗡ would represent *k*. The symbols for vocality, nasality, etc., are similarly incorporated into the consonant symbols. This suffices to show the two chief features of the system: (1) its simplicity and perfect consistency; (2) the correlation of the symbols. Thus, when the student has learned to recognize the symbol for *m* as differing from *b* only in the addition of the sign for emission through the nose, he is at once able to recognize and form for himself the symbols of *ng* and *n*, if he is already acquainted with those of *g* and *d*. Such a system is evidently of the highest value in all philological investigations which involve the study of sound-changes in different languages. It has been found that many phenomena of language, such as 'umlaut,' which, when formulated in the ordinary Roman type, require a long technical exposition to be made intelligible, explain themselves at once without further comment when transliterated into the V. S. symbols. A striking example of the value of V. S. in philological research is afforded by J. A. H. Murray's admirable work on the *Southern Dialects of Scotland,* in which the phonetic portion owes its clearness and exactness mainly to the use of visible speech. V. S. has been employed also by Sweet in his *History of English Sounds;* and A. J. Ellis, the father of scientific phonology in England, though employing a system of his own, constantly refers to V. S. to establish the absolute value of his symbols.

The practical applications of the system to the acquirement of the pronunciation of foreign languages, to telegraphy, to the instruction of the deaf and dumb (for which it is already largely employed), and to general elocutionary purposes, are evident: also see PHONETIC ALPHABET.

VISIER: see VIZIER.

VISIGOTH, n. *vĭz'ĭ-gŏth:* one of the western Goths, or that branch which finally settled in Spain and s. France, in contradistinction to the *Ostrogoths* or e. Goths (see GOTHS). VIS'IGOTH'IC, a. *-gŏth'ĭk*, pertaining to the Visigoths.

VISION, n. *vĭzh'ŭn* [F. *vision*—from L. *visĭō* or *visĭōnem*, sight—from *visus*, pp. of *vidērĕ*, to see: Skr. *vid*, to know]: the act of seeing; sight; the power or faculty of seeing; perception of external objects; that which is the object of sight; something imagined to be seen; an apparition; a spectre; a revelation from God: V. to see, as in fancy or a vision. VIS'IONAL, a. *-ŭn-ăl*, pertaining to vision. VIS'IONIST, n. one who sees or believes in visions. VIS'IONLESS, a. *-lĕs*, without sight or vision. VIS'IONARY, a. *ĕr-ĭ*, affected by phantoms or delusions; imaginary; of or pertaining to visions; without solid foundation; impracticable: N. a visionist; one whose imagination is idly fertile; one who forms impracticable schemes. VIS'IONARINESS, n. *-nĕs*, the quality of being visionary or unreal; the character of a visionary.—SYN. of 'visionary, n.': enthusiast; fanatic; zealot: of 'visionary, a.': fanciful; fantastic; unreal.

VISION: act of seeing, or that faculty of the mind by means of which, through its appropriate material organ, the Eye (q.v.), we perceive external phenomena. Considered in the latter signification, vision includes questions of high importance in relation to some of the most intricate problems of philosophy (see PERCEPTION). The present article has reference to the phenomena and laws of vision proper. In opposition to the bulk of mankind, who believe undoubtedly that they actually *see* the externality and solidity of the bodies around them, Bp. Berkeley maintained that these properties are not the immediate objects of sight at all, but are simply ideas derived originally from the touch, and erroneously attributed to vision, in consequence of their having been uniformly experienced concurrently with certain 'visible signs' (e.g., color), with which alone the sense of sight is truly conversant. This theory of vision has received the adhesion of many eminent metaphysicians.

First, as to the externality, or outness, of objects; or, which is the same thing, their distance from the eye. This, Berkeley maintains, cannot of itself and immediately be seen: 'For distance being a line directed endwise to the eye, it projects only one point in the fund of the eye; which point remains invariably the same, whether the distance be longer or shorter.' To this position, everywhere assumed by Berkeley as indisputable, and by his followers admitted to be so, it is objected that it contains an unwarranted assumption—viz., that a ray of light is, by its very nature, incompetent to convey an impression indicative of its possessing length or extension; or, to speak more accurately, it assumes that 'apparent distance' is not at all affected by a variation in the actual length of the ray intervening between the eye and the object. Yet it seems obvious that the facts of vision do not admit of our arguing the matter, as though the line extending from any point of an object to the eye were a mere mathematical abstraction. Every visible point sends forth diverging rays, which form a cone whose base is on the pupil of the eye; and to the eye the place of this visible point is at the intersection, real or virtual, of the rays in question: real, when the radiant point is viewed directly; virtual, when the rays, either by refraction or reflection, are diverted from their original path before reaching the eye. To take a case of refraction: if we notice the distance of a coin lying at the bottom of an empty vessel, we shall observe, after filling the vessel with water, a manifest diminution in the apparent distance of the coin, the reason being that the rays, on their emergence from the water, are bent outward, so that the point of their virtual intersection is brought nearer to the eye. In reflection, the place of a visible point is, in like manner, referred to the point of virtual intersection of the cone of rays incident on the pupil; and by multiplied reflections the apparent distance of a point actually adjacent to the eye may be increased to an almost indefinite degree. It is forcibly contended by Berkeley that these facts, involving geo-

metrical considerations known only to few, and by none consciously realized in the act of vision, cannot be concerned in our appreciation of distance by the visive faculty. Yet these, and numberless similar experiments, render it evident that both 'apparent distance' and 'apparent place' are closely dependent on these geometrical conditions; and, therefore, without assuming that vision is performed by the aid of connate or instinctive geometry (a notion justly condemned by Berkeley), it yet seems highly probable that these lines and angles are the exponents and invariable concomitants of an actual operation of light on the eye, specific in its character, and—by reason of its necessarily varying, *pari passu*, with every change in the distance of the point of intersection of the visual rays—fitted to convey to us an intuitive perception of varying distance.

It is known (see EYE)—as indeed necessarily follows from optical principles—that the eye does actually undergo specific modifications, depending for their amount on the distance of the object; and there therefore seems an intrinsic probability that these distantial variations in the organ of sight are correlated to those facts of our consciousness which we denominate variations of visible (not tangible) distance; and as, furthermore, it may be demonstrated by optical experiments that the 'apparent distance' of a visible point is directly modified, to our perception, by a simple change in the mutual inclination of its diverging rays, it seems an inevitable conclusion that that agency of light which suggests to our minds differences of distance is competent to suggest distance itself.

Berkeley was quite aware of the necessary connection between the distance of an object and the divergency of the rays which it emits, though it may be doubted whether he adequately weighed the importance of the train of consequences evoked within the eye itself by this variable divergency of incidence; but he affirms that the mind is not by these means helped to a conception of distance, except so far as by experience we have found that increased divergency, carried to the extent of producing 'confused vision,' is constantly associated with diminished distance. And in proof that this association is merely accidental, Berkeley cites a curious optical experiment, as showing that where the incident rays are caused slightly to converge, instead of their suggesting, as one would expect, that the object is at an enormous distance, the result is altogether different—viz., at first, when the eye is close to the lens, and vision distinct, the object is seen at its true distance, but afterward, as the eye is gradually withdrawn, and vision becomes continually more 'confused,' the object appears enlarged in all its dimensions, and approaching nearer and nearer, until it vanishes in mere confusion from the view. 'This phenomenon,' he says, 'entirely subverts the opinion of those who will have us judge of distance by lines and angles, on which supposition it is altogether inexplicable.' To which it is replied that the explanation given by Berkeley is not the true one:

inasmuch as it has been shown by Prof. Wheatstone that, when the dimensions of a retinal picture are continuously increased (as in the above experiment), the object appears to approach in the most evident manner.

From the doctrine of Berkeley, that the sight is not immediately perceptive of distance, it necessarily follows that the parts of a solid object will not be seen as some of them more remote than others, but as if situated all in one and the same plane: this opinion has accordingly been maintained by some who have advocated this theory; yet its unsoundness seems manifest; for if objects be originally seen, not as solid objects, but as perspective representations on a plane, then this plane must be seen either at no distance (which is absurd), or at the same distance for all objects (for which no reason and no evidence can be assigned), or at distances varying with the distances of the objects: but as the last two and only tenable suppositions assume the visual perception of distance, which is the very principle sought to be invalidated, the theory is thus shown futile and self-contradictory. If it be admitted that, by the constitution of the organ of sight in relation to light, we are perceptive of distance at all, it is in the highest degree probable, judging not only from analogy, but also from the proved distantial affections of the eye, that we perceive by the sight degrees of distance: and a perception of the latter implies, it has been shown, a perception of trinal dimensions. Now, though it is strenuously maintained by the adherents of Berkeley that this is not a primitive attribute of vision, it is not denied by any that, in the exercise of our mature sight, we do undoubtedly perceive the outness, the distance, and the trinal extension of visible objects; but, say they, these very qualities, not being modifications of light or colors, are only in appearance directly perceived by the eye; they are, in fact, the product of tactual experience, which, by long and invariable association with the phenomena proper to sight, are now instantaneously suggested by them, in a manner so intimate that the two sets of perceptions have become, to our consciousness, indissolubly one. Against this, which in effect is to affirm that we cannot see an object to be possessed of trinal dimensions until its occupancy of space is assured to us by the touch, it is maintained that we see objects to occupy space, and that what we owe to experience is a knowledge that the major part of these visible appearances have, underlying them, that which, on our making the appropriate disposition of our bodies, would produce in us tactual sensations. We say advisedly the major part; because there are many objects in nature, e.g., wreaths of smoke and vapor, which, though to the sight visibly possessed of trinal dimensions, are totally imperceptible to the touch. And this suggests the remark that a great diversity of opinion has arisen out of the ambiguous meaning of the word 'solidity,' by which those who agree with Berkeley always signify, not mere occupancy of space, which, as we have shown, may be associated with a total absence of tangible

qualities, but also 'resistant extension' in three dimensions, which, beyond all doubt, is solely cognizable by the touch. It is, of course, in the former sense alone that it is attempted to vindicate to the sight an immediate perception of 'solidity;' and the term 'occupancy of space' is used not at all in the sense of mechanical exclusion—an idea manifestly derived from touch—but only as affirming the immediately perceived trinal extension of visible objects. Moreover, there are many substances of extreme hardness, therefore in the highest degree perceptible to the touch, which, though set in a strong light, remain quite invisible—e.g., the sheets of plate-glass used in producing 'ghost-illusions.' Indeed, strictly speaking, all *perfectly* transparent substances, and all *perfectly* reflecting (polished) surfaces, are invisible. Further, there are many appearances in nature into our perception of which there enters no element of tactual experience, even as it respects variety of surface (color, of course, being excluded from this consideration)—e.g., the waves of the sea, spread out in long undulating lines, or breaking in foam upon the shore; and all those objects which, by their minuteness and the delicate diversifications of their shape and outline, elude the cognizance of the touch: this class of facts illustrate the complete distinction and independence which subsists between the two sets of sensations, originating, respectively, with the sight and the touch—a point strongly enforced by Berkeley himself, who did not hesitate to affirm, not only that our habit of referring the two sets of sensations to the same objects is the mere effect of our having experienced them together, but that the two sets of ideas thus 'intromitted into the mind' belong, in fact, to two classes of objects, numerically distinct—the one outward, distant, and tangible; the other visible, but at no distance, and therefore, in reality, contained within the mind itself. But it has been pointed out that this very distinction, taken in conjunction with the undoubted fact that we do in maturity apprehend by the sight the distance of visible objects, furnishes strong presumption that those perceptions cannot have belonged originally to the touch. How little tactual sensations are able to modify visual perceptions has been well exemplified by the fact that 'a straight stick, with one end placed in a basin of water, would still appear to the sight to be bent at that end, after a thousand proofs by the touch that it was otherwise.' In the same way, the finger immersed in water appears 'unnaturally bent, though the experimenter feels it to be otherwise.'

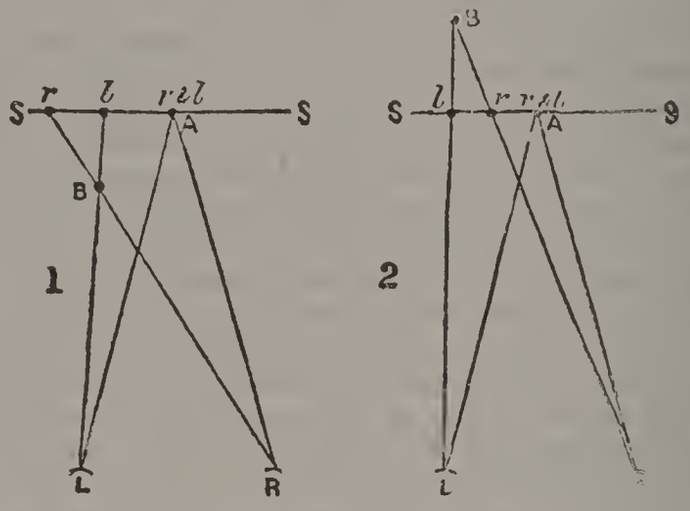
The nature of 'visible' or 'apparent distance,' and how it compares with 'real distance,' will be considered in connection with apparent, as contrasted with real magnitude. We inquire, first, what are the optical conditions within the eye itself which determine our perception of the direction of a visible point. Every such point, as above remarked, radiates to the eye a cone of diverging rays, whose base is situated in the pupil of the eye; and these rays, being refracted in their passage through the eye, are brought to

a focus on the retina, thus forming another cone, whose base is opposed to that of the incident cone, while its apex coincides with the focal point of the refracted rays. If the point of emission be placed directly before the eye, that point will be seen in the direction of the common axis of these two cones—i.e., in the optic axis; and the central point in which this axis passes through the common basis of the two cones is called the optical centre of the eye. Let us suppose, now, another visible point, a little above the first, but at an equal distance from the eye; this, too, will send forth to the eye diverging rays, which will, in like manner, be refracted to a focus on the retina at a point a little below the preceding; and the line of visible direction will pass from the point of convergence on the retina through the optical centre. Now, it is evident that the rays, by means of which we see a visible point, come to the retina from all possible directions within the limits of the cones that they collectively form. How comes it, then, that we perceive the object in only one determinate direction? The explanation usually given (founded on experiments in which a portion of the cone has been excluded without apparent change in the visible direction) is, that—by the constitution of the sense—when any point in the retina receives the apex of a cone of rays, we perceive the object in a right line extending from that point of the retina through the optical centre; or, according to other explanations, in a right line perpendicular to the surface of the retina at that point. It will, however, be more consistent with the principle that the incidence of light is accompanied by a positive action, related to its direction as well as to its other properties, if we express the law of visible direction by saying that, when a multitude of rays from all possible directions fall on a retinal point, the perceived direction is the mean or resultant of them all; which is just as true an account of the phenomena, and amounts, we think, to something more than a verbal distinction. The optical facts thus briefly indicated, if followed out with respect to all the visible points forming the objects of sight, render it evident that inverted images of the latter are formed on the retina; and the inquiry is prompted, how these can give rise to the erect vision. On consideration, an explanation of this old and much-debated 'paradox of vision' is found involved in the preceding statement of the law of visible direction, in whichever way that law may be expressed; and, as has been shown by previous writers, the difficulty itself has arisen solely from the assumption, contrary to fact, that our act of vision is our *seeing* the retinal pictures; whereas, considered as images, they are not even the means, but only the concomitants of that operation of light by which we see. Even this important distinction, it has been asserted, does not convey the whole truth; inasmuch as in a strict sense there is, to the one who is *seeing*, no *image* on the retina, but only a concourse of rays, which, *to the eye of another person*, will undoubtedly give the perception of an image, but cannot be proved to exist, as an image, ex-

cept in relation to this second observer. It is therefore with this reservation that the term retinal images is here used. As a consequence of all the lines of visible direction passing through the centre of the eye, it follows that, as an object recedes from or approaches the eye, its retinal image becomes proportionally less or greater; and, in like manner, the visible object itself varies in magnitude, under certain limitations, to be presently referred to, with every change in its distance. But as 'the magnitude of the object which exists without the mind continues always invariably the same,' it is evident, argues Berkeley, that 'whenever we speak of the magnitude of anything, we must mean the tangible magnitude,' which alone is measurable by 'settled stated lengths.' The sense in which this is true clearly illustrates the nature of magnitude and distance, as apprehended by the sight, in contradistinction to what is called real magnitude and real distance, the product of tactual experience. It must be understood not as imputing to the touch a superiority in mensurative capacity, but as meaning simply that by the touch we come to know that the external world is endowed with resistant qualities—such as hardness, impenetrability, and incompressibility—qualities which we cannot conceive as modifiable by our bare visual perception of them; and from this experience, it is claimed, accrues our conception of the reality and actuality of the magnitude and distance of objects, accompanied by a belief that the variability of magnitude and distance perceived by the sight is an appearance only, and dependent on conditions solely of a subjective kind. If this be a correct theory, we are not forced to deny, with Berkeley, that the objects of sight are numerically the same as those of which we are cognizant by the touch.

We pass to the concluding part of the subject—'single vision with two eyes;' in treating of which we shall have recourse to the researches of Sir Charles Wheatstone (see STEREOSCOPE). From what is stated under that title, it is obvious that the question of single vision with two eyes is naturally divisible into two classes—the first including those cases in which the optic axes are parallel, and the retinal images exactly alike; the second, those in which the optic axes are convergent, and the retinal images dissimilar. Now, to see an object double is to see it in two different places at the same time; therefore, if it can be shown that by the law of visible direction an impression on corresponding points of the two retinæ is necessarily referred to the same place, this will account for our single vision of the object at that spot. And on consideration it will be plain that this is really what happens when the optic axes are parallel, and the images identical. But it is evident also that this explanation does not apply to the second class of instances, in which the only visible point which depicts itself on corresponding portions of the two retinæ is that point to which the optic axes are directed. All other points, whether situated before, beyond, or in the plane of the hor-

opter,* are projected on non-corresponding points of the retinæ; and as these conditions were presumed to be inconsistent with single vision, it was asserted by Aquilonius that objects are seen single only in the plane of the horopter (it has since, with greater consistency, been said, only at the point of intersection of the optic axes): but that this is not true is evinced by our common experience that, without movement of the optic axes, we possess a certain limited field of distinct vision. Its complete refutation, however, is involved in the theory of stereoscopic vision, which may be thus explained: Let the optic axis of the right eye (R) and of the left eye (L) be converged on the point A; suppose another point, B, slightly to the left, and in advance of



A; and then through the point B draw lines from L and R respectively intersecting the plane of the horopter in r and l (fig. 1). Now, if two diagrams, SS, be prepared (one representing l and A, the other r and A), and these be presented to their appropriate eyes in the stereoscope, with the view of each eye limited to its own picture, the points r and l will be seen as a *single* point, situated not on the paper, but in advance of it, in the point of intersection of the lines of visible direction, indicated in the above construction by Rr and Ll. If the point B be supposed beyond A, also to the left of it, the lines drawn from L and R to B will intersect the plane of the horopter in l and r (fig. 2); and stereoscopic pictures SS prepared under these converse conditions will exhibit the points l and r as a single point placed behind A at the point of intersection of the lines drawn from L and R respectively. This simple rule involves, as it seems to us, the true principle of the stereoscope: and it is capable of being applied to the most complicated stereoscopic pictures. For, in a stereogram, let l and r stand for identical parts of the left and right pictures respectively, and suppose the pictures superposed; those parts which, read off laterally from left to right, stand in the order lr will recede, and those in the order rl will protrude (relatively to those parts of the pictures in which r and l absolutely

* The horopter is a right line drawn through the point of intersection of the optic axes parallel with a line joining the centres of the eyes; a plane drawn through this right line at right angles to the plane of the optic axes is called the plane of the horopter.

overlie each other), when the pictures are viewed together in the stereoscope. It appears, then, that vision of the third dimension of space is directly obtained by impressions on non-corresponding retinal points; the proof of this being given in the appearance of solidity experienced in the stereoscope, though only perfectly plane representations are employed; but it would be an error to suppose that this non-correspondence is without a limit; and the question remains, to what extent the retinal points affected may be non-correspondent, consistently with single binocular vision. Without attempting any definite solution of this difficult question, it appears highly probable that this limit is determined by the same law which regulates our distinct vision of objects by means of rays inexactly focused on the retinæ; for, according to T. K. Abbott, 'as long as the rays are contained within the area of one sensitive minimum, the sensation will be that corresponding to the vision of a point;' and 'a certain amount of dispersion does not interfere with distinct vision.' It seems certain that the double perception experienced of the farther of two objects, when the optic axes are fixed on the nearer, or *vice versa*, can arise only when the object, thus doubled, is situated within the angle of the optic axes (whether before or beyond their intersection); for under these circumstances only, the sensitive points affected are not simply non-correspondent, but are utterly diverse, being in fact on different sides of the centres of the retina in the two eyes. That the law of projection of the various points composing the relief of a stereoscopic object is correctly stated above, is strongly corroborated by a curious experiment by Sir C. Wheatstone, in which solid objects are placed in the stereoscope, instead of pictures —e.g., two skeleton cubes so placed that, when the optic axes converge on them, identical pictures are depicted on the retinæ, in which case all appearance of relief vanishes, and a perfectly plane perspective representation of a single cube is alone visible; the reason being, that the lines of visible direction for each point intersect each other, neither before nor beyond, but *in* the plane of the horopter, where, accordingly, the object is seen as a perspective projection. The same rule holds when the right and left eye pictures are interchanged, for the pictures being supposed, as before, to overlie one another, the parts *lr* become now *rl*— that is, instead of having their point of intersection beyond the plane of the horopter, they have it before that plane; and this, *mutatis mutandis*, being true of all the parts of the pictures, the stereoscopic resultant is the converse of that which would be perceived but for this abnormal arrangement. In these phenomena, named by Sir C. Wheatstone the 'conversion of relief,' the usual relations of distance also are reversed, the nearer parts being seen as farther, while the latter are perceived to be of larger dimensions than the former; and, the same principle being applied to the vision of solid objects by means of an instrument called the Pseudoscope (q.v.), also invented by Sir C. Wheatstone, they are seen as if turned inside out, and under divers other extraordinary aspects (see PSEUDOSCOPE). But, as to many

of them, the facility of conversion is found to depend, not on the optical conditions, which of course remain invariable, but on mental conditions—e.g., previous familiarity or otherwise with the converse forms suggested; in short, on previous *visual* experience.

Passing to those cases in which the retinal pictures are identical, and the optic axes convergent, we find the law that the object is seen in the plane of the horopter: this is conclusively proved by a beautiful experiment, suggested by Sir D. Brewster. If, while looking at a wall-paper consisting of a small pattern continuously repeated at intervals not exceeding 2½ in. from centre to centre, we cause the eyes to converge to a point in front of the wall, the paper will appear to advance to that point, and will there be plainly visible, in spite of the contradiction of the touch, which of course cannot feel the wall where it is seen; while, on the other hand, the eye can perceive no wall in the place where the touch affirms it to exist. The converse of this experiment, though more difficult to perform, is equally curious and instructive. It has also been shown by Sir C. Wheatstone, that if an increasing convergence of the eyes be unaccompanied by its usual concomitant, a corresponding enlargement of the retinal pictures, the object is seen as if continuously diminished in all its proportions, albeit the size of the retinal images remains unaltered. This experiment, which, with several others of almost equal interest and importance, may be performed by means of the stereoscope, also establishes the fact that every degree of convergence of the optic axes is associated with the particular adaptation of the eye suited for distinct vision at that distance. This adaptation is, of course, directly dependent on the divergency, less or greater, of the impinging rays; and this again stands in a necessary relation to the distance, real or virtual, of the point from which they diverge—a branch of the subject already sufficiently noticed. All observations and experiments concur in showing that a part of the highest importance is played in vision, by the covergence of the optic axes, in particular, so far as this is conjoined with a difference between the two retinal pictures: and, for this reason, there is little need for us (in our limited space) to enter on a discussion of the evidence obtained from those persons, blind from birth, who have gained their sight by means of a surgical operation ; since in almost every case only one eye at a time was operated on, and the information then obtained from the patients, under circumstances of so much difficulty, is generally admitted to be dubious and unsatisfactory.

By mere modification of the light incident on the eye, the same visible objects may be seen under infinite variations of figure, situation, and magnitude; while their real figure, real situation, and real magnitude, as apprehended by the touch, remain unaltered; but these phenomena, artificially induced, argue nothing against the general fact that under normal circumstances we find, in the very place of the visible objects, those 'dynamical qualities'

which form the sum total of our tactual experiences. To Berkeley is due the credit of having first pointed out the original entire disconnection and subsequent intimate blending of the two sets of experience—visive and tactual; but, if the views above set forth be correct, he erred in supposing that our realization of the geometrical proportions and relations of visible objects is dependent on the suggestions of touch, and not on the exercise of a primitive and inherent function of sight. To the popular thought, the *objects of sight* have a positive and equal existence in absolute darkness, and are simply rendered visible by the light; whereas they are, in truth, the light itself variously modified. But, in conclusion, while fully admitting that light and its modifications, viz., color in all its varieties, form the sole objects of sight, we venture to maintain that we know color only by our perception of it, as making up, by its superficial distribution, the visible form and shape of the objects of the outer world; and that this our perception of the shape, relative magnitude, and situation of visible objects is immediate, and strictly regulated by the laws of light in relation to the visual organ, irrespective of, and even in opposition to, tactual experience; but, at the same time, we hold to the touch alone man owes his ever-present and ineradicable belief that these visible appearances have underlying them a materiality which we cannot conceive as actually modified concurrently with those changes of form and magnitude perpetually occurring in relation to our faculty of sight; therefore, in all questions which relate to real size or real distance, we necessarily have recourse in thought to those qualities of matter which are apprehensible by the touch.

That an instinctive power of direct visual perception is possessed by the young of the lower species is not denied by any: whether a like power has been bestowed upon man, is left to the consideration of the philosophers.

See Berkeley's *Theory of Vision;* Wheatstone, *On the Physiology of Vision;* Review of Berkeley's *Theory of Vision,* by Samuel Bailey; review of the last named work by J. S. Mill, in his *Dissertations and Discussions; Sight and Touch,* by T. K. Abbott; Helmholtz's *Popular Lectures;* articles on Vision by Sully, in *Mind,* Nos. IX. and X.

VISION, in *Psychology:* the main problems which require solution in connection with our powers of vision are (1) the explanation of our ability to perceive objects as external and at a distance. This is a philosophical issue with which all philosophers of note have concerned themselves. Typical solutions are those of Berkeley and James. Berkeley maintains that the knowledge which we gain from vision of an external world in space is based primarily on touch and only by association of touch with vision do we get visual apprehension of the elements of distance. Moreover, for Berkeley the world of material

objects is itself ideational (see BERKELEY, and IDEALISM). James views visual processes as characterized by the capacity to mediate voluminousness and distance as truly as touch. He takes his stand on the immediate subjective experience. (2) There is the problem of color vision. (See COLOR SENSATION.) This involves an explanation of color mixtures (q.v.), complementary colors (q.v.), after-images (q.v.), color blindness (q.v.), and other related problems. The general tendency of the theories now current favors the belief in a possession by the eye of a few elementary color processes which are stimulated in various combinations to produce the complex experiences of color vision. The primary colors psychologically are probably red, yellow, green, and blue. To these must be added white and black, or grey, as true elementary forms of color experience. (3) Last there is the problem correlated with problem (1) as to the exact psychological and physiological elements involved in our use of the eyes to discern distance, form, size, etc. Berkeley maintained that we cannot apprehend distance by the eye alone, because the rays of light which proceed from a point 20 ft. away come to a focus at a single point on the retina, just as do the rays from a point 40 ft. away. Whether the object be at the one distance or the other we are, therefore, not able to say, if we are dependent upon vision alone; for one and the same retinal point is stimulated in both cases. We must, therefore, learn from touch and movement of the body as a whole as to the third dimensional relations of objects. This view is now generally discredited. In point of fact, the eye is a binocular organ, i.e., we have two eyes, and it is moreover supplied with muscles which operate differently when we look at objects nearer and further from us. The right eye when it looks at a solid object sees a different part of it from that seen by the left eye, and the total experience which we obtain visually under such conditions gives us a visual perception of solidity. The stereoscope (q.v.) employs this principle to produce most extraordinary illusions of solidity. Pictures are taken of objects which exaggerate the disparity of vision of three dimensional objects as seen by the right and left eye respectively. These are then presented each to its appropriate eye, and by prisms or other optical devices the pictures are brought to bear upon the proper regions of the retinas. The pictures under such conditions are seen as one and as presenting remarkable solidity of appearance. In judging distances visually other factors are used besides these mentioned. Shadow, brightness, color, intervening objects, are all employed at times. The size and distinctness of the retinal image also is important. Other things equal, the farther an object, the smaller its image on the retina; also the greater its indistinctness. Illusions are often caused by unexpected and unappreciated changes in some of the circum-

stances mentioned. In fogs objects loom tremendously. This fact is referred to the large retinal image which is the sign of a big object combined with dimness of outline, the sign of distance. A distant object of such magnitude of retinal image must be interpreted as a very large object. This interpretation is not reflective. We react according to our life-long habit without reflection. The inability of landsmen to judge accurately distances at sea arises from a similar disturbance of common criteria for judging. The same sort of illusions are met with by persons in the mountains for the first time.

The conditions of single vision when two eyes are used are now fairly well recognized. The point of clearest vision in the retina is known as the fovea. If the foveæ of the two eyes are stimulated at once, we always get single vision. If figures are presented to the two eyes, which can easily be interpreted as belonging to a single object, they will be seen as such. For example, if two lines are shown, one vertical seen by the left eye, and one horizontal seen by the right eye, the two will be seen as a single cross. If, on the other hand, the figures were very complex and could not easily be interpreted as one, first one will appear and then the other. This phenomenon is called retinal rivalry. On each retina, aside from the foveæ, is a point which, if stimulated with a certain point on the other retina, will produce single vision. All other pairs of points, if stimulated together, produce either double vision or blurred vision. These points producing single vision are called corresponding points. Corresponding points are found in geometrically similar quadrants of the retinæ. The upper nasal portion of the right retina corresponds thus to the upper temporal portion of the left retina. If one retina be superposed on the other, meantime keeping the up and down, right and left relations of each constant, a pin thrust through the two would strike corresponding points. When these relations are worked out, it will be found that the nasal half of each retina corresponds to the temporal half of the other, while the upper half of one corresponds to the upper half of the other.

VISIT, v. *vĭz′ĭt* [F. *visiter*—from L. *visitārĕ*, to go to see; *visĕrĕ*, to behold—from *visus*, pp. of *vidērĕ*, to see]: to go or come to see (a person, place, or thing) in the way of business, curiosity, study, ceremony, duty, friendship, etc.; to be in the habit of going to see others; to make calls; to stay with, as a guest; to inspect officially; in *Scrip.*, to reward or punish: N. act of going to see another; a temporary call; act of going to view or inspect; etc. VIS′ITING, imp.: ADJ. authorized to visit and inspect: N. act of going to see. VIS′ITED, pp. VIS′ITANT, n. *-ĭ-tănt*, one who visits; a visitor: ADJ. visiting. VIS′ITA′TION, n. *-tā′shŭn* [F.—L.]: state of being visited; an official visit, as by a bishop; inspection; infliction of good or evil; state of suffering judicial evil. VIS′-

ITOR, n., or VIS'ITER, n. *tĕr*, one who visits; one who is authorized or has a right to inspect the working or internal government of some institution or corporation—appointed usually as representative of the founder. VIS'ITRESS, n. *-trĕs*, a female visitor. VIS'ITATO'RIAL, a. *-tō'rĭ-ăl*, pertaining to one who inspects officially. VISITING-CARD, a name-card; a name and address card.

VISITA'TIONS, HERALDS': periodical circuits formerly performed by the provincial kings-at-arms in England, to take cognizance of the arms, pedigrees, and marriages of the nobility and gentry. The earliest visitation, in pursuance of a royal commission, was made by Thomas Benolti, Clarencieux, 1528–9: thereafter, the visitations were repeated at periods varying from 25 to 30 years: the latest commission was dated 1686, May 13, and under it some pedigrees were recorded as late as 1703–4. The records of the visitations contain a mass of historical and genealogical information of great value: they form the principal source of evidence regarding the hereditary right to bear arms in England.

VISITE, n. *vĭ-zēt'* [F. *visite*, a visit (see VISIT)]: a close-fitting garment, somewhat resembling a sleeveless jacket, used by women for outdoor wear.

VISOR, or VIZOR, n. *vĭz'ĕr* [F. *visière*, a visor—from OF. *vis*, the face—from L. *visus*, pp. of *vidērĕ*, to see]: a mask; that part of a helmet which covered the face; it was movable and perforated for seeing and breathing; a Beaver (q.v.); a vizard or mask; a projecting piece on the front of a cap for shading or protecting the eyes: V. to mask. VIS'ORED, a. *-ĕrd*, masked; disguised.

VISTA, n. *vĭs'tâ*, VIS'TAS, n. plu. *-tâz* [It. *vista*, view from L. *visus*, seen; *vidērĕ*, to see]: a view as through an avenue of trees; the rows of trees that form the avenue or walk.

VISTULA, *vĭs'tū-lâ* (L. *Vistula* or *Visula*, Ger. *Weichsel*, Russ. *Wisla*): important river of Austria, Poland, and Prussia; rising in Austrian Silesia, near the frontier of Galicia, in a morass in the Jablunka Mountains, 15 m. s.e. of Teschen (q.v.), 3,675 ft. above sea-level. Formed by three head-waters, the White, the Little, and the Black Vistulas, the V. flows n.w. a few miles to the village of Weichsel, where its course is marked by a fall of 180 ft., and thence to the town of Schwarzwasser, where it leaves the mountains. At this point the V. turns n.e., flowing past Cracow to its confluence with the San, 10 m. below Sandomierz forming the boundary between Galicia and Poland. From its confluence with the San, the river turns n., and enters Poland, which it traverses in a general n.w. direction, passing Lublin, Warsaw, and Lipno. Leaving Poland, it enters the kingdom of Prussia, flowing w.n.w. to its junction with the Bomberger canal: thence n.n.e., past Kulm and Schwetz, to Graudenz, where it turns n., and flows to its embouchure in the Baltic Sea, which it enters by several mouths. About 10 m. below Marienwerder, it throws off an arm called the Nogat, which, flowing n.e. 32 m., enters

the Frisches Haff by about 20 mouths. The main stream continues to flow n. 115 m., dividing, however, into two branches, one of which flows into the Frisches Haff, the other into the Gulf of Danzig at Weichselmünde, 3 m. below Danzig. The V. receives from the right the Bug, the San, the Dunajec, and the Wieprz; from the left, the Pilza and Brahe. Total length 690 m.; drainage-area 72,000 sq. m. It becomes navigable for small vessels at Cracow, and for large vessels at the confluence of the San

VISUAL, a. *vĭzh'ū-ăl* [F. *visuel*—from mid. L. *visŭālis*, visual—from L. *visus*, sight—from *vidērĕ*, to see]: pertaining to sight; used in vision. VIS'UALLY, ad. *-lĭ*. VISUALITY, n. *vĭz-ū-ăl'ĭ-tĭ*, the state of being visual; a view. VISUAL ANGLE, the angle at which an object is viewed. VISUAL RAYS, the beams of light which are imagined to reach the eye from the object observed.

VISWÂMITRA, *vĭs-wâ'mĭ-tra:* personage prominent in the legendary history of India; a descendant of King *Purûravas* (q.v.), who was an ancestor of Kus'ika. According to several accounts, V. was maternal uncle of Jamadagni (see VISHN'U—6th Avatâra). He had 100 sons, 50 of whom were, for an offense that they committed, degraded by him to become outcasts, and the progenitors of the Andhras, Pun'd'ras, S'abaras, Pulindas, Mût'ibas, and other frontier tribes, which in the Vedas are called Dasyus, or robbers: see VEDA. His fame is founded chiefly on the remarkable fact that though by birth a Kshattriya, or a man of the military caste, he gained admission into the Brâhmanic caste, after a long contest with the R'ishi *Vasisht'ha* (q.v.). A kind of consecutive biography of V. is given in the first book of the Râmâyan'a, . Its substance is as follows: Roaming over the earth with his armies, V. came to the hermitage of Vasisht'ha (q.v.), and was received by the saint in the most sumptuous style. Vasisht'ha could afford thus to entertain the king, because he possessed a fabulous cow of plenty, that yielded him everything that he desired (see a parallel legend in VISHN'U—6th Avatâra). V., becoming aware of the source of Vasisht'ha's wealth, wished to possess the cow, and offered to purchase her from Vasisht'ha. The saint refused the offer, and the king seized her, intending to carry her off by force. But the cow resisted, and ultimately displayed her supernatural powers in producing from different parts of her body numerous peoples, by whose aid Vasisht'ha destroyed V.'s armies. The king then had recourse to his magical weapons, but he was defeated by those of Vasisht'ha; and in his humiliation he exclaimed: 'Contemptible is the might of a Kshattriya; a Brahman's might alone is might;' and to attain the rank of a Brahman he immediately resolved to practice the utmost austerities. Accordingly he went to the south, and performed severe penance for a thousand years. At the end of this period, the god Brahman appeared, and announced to him that he had become a *Râjarshi*, or royal R'ishi. Not satisfied with this degree of holiness, V. continued his austerities, and at the end of another thousand years the god Brahman conferred on him the dignity of a

R'ishi. Not yet satisfied, he went on practicing still fiercer austerites, though interrupted by the allurements of a heavenly nymph whom the gods sent to him for that purpose: thus he attained the rank of a *Maharshi*, or great R'ishi. After other two thousand years of still more rigorous penance (again interrupted by the gods, as before), the gods, headed by Brahman, came to acknowledge that he had now become a Brahmarshi, or Brâhman'ic R'ishi; and Vasisht'ha himself was compelled to acquiescence in the result. For other legends relating to this contest, see vol. I. of Muir's *Original Sanscrit Texts* (Lond. 1858) (see also HARISCHANDRA).

VITACEÆ, *vī-tā'sē-ē:* natural order of exogenous plants (known also as *Ampelideæ* and *Sarmentaceæ*), of which the common vine may be regarded as the type. About 260 species are known, natives of warm and temperate climates all shrubs, mostly climbing; with simple or compound leaves, with or without stipules, lower leaves opposite, upper leaves alternate; the flower-stalks racemose, opposite to the leaves, sometimes (as in the vine), by abortion, changing into tendrils.—The only plant of the order of much value, in an economical view, is the Vine (q.v.); nor are there any fine fruits except its fruit (the grape), and that of species so closely allied to it as to be probably mere varieties. Species of the genus *Cissus* and of *Ampelopsis* are sometimes planted for ornament. *Cissus antarctica* is the KANGAROO VINE of New Holland; and *Ampelopsis quinquefolia*, often called VIRGINIA CREEPER, is a frequent ornament of the fronts of houses both in America and Europe, attaching itself to the wall by tendrils terminating in a peculiar kind of sucker and climbing to a great height.

VITAL, a. *vī'tăl* [F. *vital*—from L. *vītālis*, pertaining to life—from *vīta*, life: It. *vitale*]: pertaining to life; necessary to life; being that on which life depends; containing life; essential; in *OE.*, able to live. VI'TALLY, ad. *-lĭ.* VITALITY, n. *vī-tăl'ĭ-tĭ*, the principle of life; power of life or existence; principle of growth; animation. VITALIZE, v. *vī'tăl-īz*, to furnish with the principle of life; to give life to. VI'TALIZING, imp. VI'TALIZED, pp. *-īzd.* VI'TALIZA'TION, n. *-ĭ-zā'shŭn*, the act or process of infusing the vital principle. VI'TALIST, n. *-ĭst*, one who believes that no vital phenomenon, such as digestion, can be explained on purely physical and chemical principles, but that every such action is conditioned by an unknown force, higher in its nature and distinct in kind as compared with all other forces. VI'TALISM, n. *-ĭzm*, the doctrines of the vitalist. VITALS, n. plu. *vī'tălz*, the inner parts of animal bodies essential to life. VITAL FORCE, the power or principle imparting life and growth.

VITAL STATISTICS.

VITAL STATISTICS: enumerations, registrations, computations, etc., of the number of births, marriages, diseases, deaths, in a community or in a country during a year or other period; and study of this material for the purpose of developing the death-rate, longevity, liability to disease, etc., of the population to which the tables refer. Accuracy and completeness of registration and tabulation being absolutely essential, and these requisites being in many tables of V. S. non-existent, it follows that the inductions of the compilers of the statistics are to be received with very large allowance.

In tables of vital statistics and reports of statistical bureaus are usually given detailed abstracts for each year of births, marriages, and deaths, tables of the fatal diseases, classified in combination with ages, also comments on the salient points of the year's registration. The number of births, marriages, and deaths varies with the state of trade, price of food, and the seasons, and thus furnishes a test of the condition of a nation. For the collection and discussion of such data, most civilized countries have organized bureaus, with subordinate bureaus in the several parishes, communes, cities, towns, etc. In the United States there is no central federal bureau of such statistics, and such bureaus do not exist in all of the states. But in all the principal cities the work of collecting vital statistics is more or less efficiently organized, and tables showing variations of population, deaths, births, marriages, mortality from disease, etc., are periodically compiled and published.

1. *Births.*—The direct cause of the increase of population in any country (apart from immigration) is the excess of births over deaths; and this depends plainly on the following causes: (1) on the prolificness of marriages; (2) on the proportion of persons born who live to marry; (3) on the interval between the mean age of marriage and the mean age of death. All these conditions must be favorable to show the full power of increase in action. All three have never yet, on any large scale, been found operating with maximum force.

Still-births are usually excluded from the birth-rate, since they add nothing to the living population. They are also excluded from the death-rate. Still-births are usually from 2.5 to 4 per cent of all births. The still-born males are about 50 per cent greater in number than the still-born females.

The ratio of plural births in different countries is fairly constant, when large numbers are considered. During the 10 years 1874-83, in seven large countries of Europe (France, Italy, Austria, Prussia, Bavaria, Switzerland and Sweden) in 20,000,000 births the cases of twins were about 12,000 per 1,000,000, and those of triplets about 140 per 1,000,000: see LIFE, MEAN DURATION OF.

2. *Marriages.*—It seems contrary to the principles of human nature that early marriages should be united to longevity. Youthful marriages arise where the chances of the acquisition of wealth, or at least of a competence, in youth are favorable, and when these are favorable the fact seems to tell against longevity. One of the most interesting and useful points of view in which registers can be considered is the evidence which they give of the varying prevalence of the prudential check to marriage and population in different countries and places. The prudential check will show itself in two ways—either by the proportion of marriageable persons who are not married, or by the lateness of the average age of marrying. On the supposition of the natural prolificness of women remaining at the same point, the birth-rate will indicate the extent of prudential check in whichever of the two ways it may manifest itself. Suppose that from any cause the prudential restraint on marriage were to become weaker among any people than it had previously been, while the means of maintenance remained the same, what would happen? A corresponding increase would immediately take place in the annual mortality, and the mean duration of life would be correspondingly reduced. Hence many writers attribute the premature mortality all over the world mainly to imprudent marriages. However this may be, the death of one-half of the human race under the age of puberty certainly does not take place in virtue of any law of man's constitution, but from some disregard of its laws. It is declared that, while those who have the means of obedience under the conditions of civilized life generally greatly err, yet that such error is not, for the most part, greatly fatal to infant life; but that imprudent marriages, without proper means of support, are the main cause.

Consanguineous marriages seem to result in an abnormal number of physical and mental defects in the offspring; yet statistical tables do not absolutely confirm that view. Official French statistics, and the researches of individual American observers, tend to show, in the children of such parentage, liability to insanity, deaf-mutism, and idiocy, and to physical complaints or deformities. Even granting the larger percentage of such mental and physical defects in the children of consanguineous marriages, it does not necessarily follow that consanguinity is of itself the cause; for the result may be referred to heredity, whose force is intensified when two individuals of the same heredity are united in marriage. On the whole, the lesson of tables of vital statistics is adverse to the union of cousins or persons near akin.

Life-tables.—Life-tables offer an accurate means of measuring the probabilities of life and death. They represent 'a generation of individuals passing through

time.' The data which are required for the construction of a life-table are the number and ages of the living and the number and ages of the dying. (1) Theoretically, the best plan for forming a life-table would be to observe a definite number of children, say 100,000 or 1,000,000, all born at the same time, throughout life, entering in a column the number who remain alive at the end of each successive year until all are dead. In a second column the number dying before the completion of each year of life is also entered opposite the corresponding age in the first column. The number who die under one year of age is placed in the column opposite the age 0 and so on. This method being impracticable, it becomes necessary to resort to other and shorter methods. (2) If any large number of children could be traced through life, however various the dates of their birth, a life-table could be constructed from the data thus observed, if the numbers of the living and dying in each year of life are known. (3) The mortality experience of a single year may be exceptional, hence it is customary to take the experience of a series of years, five or ten, for example, as is usually done in constructing the English life-tables. The numbers of children of each sex at birth are not equal, hence it is customary to start with the proportionate number of each sex actually born. For example, in a city of 1,000,000 inhabitants in the 10 years 1890-1900 there were 300,000 living births or 30 per 1,000 annually, but the numbers of each sex were 152,460 males and 147,540 females, or in the ratio of 50,820 males and 49,180 females, these two combined making 100,000.

3. *Deaths.*—In statistical tables the death-rate (as also the birth-rate) is given in the ratio of the number of deaths (or births), to each 1,000 souls in the population, as ascertained in the next preceding official census, or as estimated from time to time by the statistical bureau. Statisticians fix the annual number of deaths in a population at 11:1,000 as the minimum; deaths in excess of that ratio are held to be due to causes that may be controlled by man. No mixed population on earth has ever reached, or for any length of time stood at, the minimum ratio.

The U. S. census returns, 1900, giving the total population of the United States as 76,308,387, including 91,219 persons in the military and naval services, shows, under the heading of mortality 1,039,094 deaths during the census year, 551,611 being males and 487,483 females. Shreveport, La., had the highest death rate in cities over 100,000 (45.5 per thousand), and St. Joseph, Mo., had the lowest, with 9.1 per thousand. Deaths from consumption totalled 111,059; pneumonia, 105,971; heart disease, 69,315; diarrhœal diseases, 46,907; kidney dis-

eases, 36,724; typhoid fever, 35,379; cancer, 29,475; old age, 29,222; apoplexy, 26,901. These figures show the mortality for the nine diseases yielding the largest number of victims. The average age at death, 1890, were 31.1 years; 1900, 35.2 years. The rate of mortality, 1900, per thousand of the aggregate population, was 17.6. The death rate per thousand in Austria, 1900, was 25.4; Belgium, 19.3; Denmark, 16.9; England and Wales, 18.2; France, 21.9; German empire, 22.1; Hungary, 26.9; Ireland, 19.6; Italy, 23.8; Netherlands, 17.8; Norway, 15.9; Scotland, 18.5; Spain, 28.9; Sweden, 16.8; Switzerland, 19.3.

Infant Mortality.—The death-rate of infants under one year old is usually expressed for the sake of accuracy as a ratio of the births. Infant mortality varies under different conditions from as low as 90 per 1,000 births up to 300 or more in different countries.

The infantile death-rate of manufacturing cities, and especially of those which have a densely crowded tenement-house population, is greater than that of other cities, while that of rural districts is comparatively low. The infantile death-rate of the densely settled State of Rhode Island in the 10 years 1892-1901 was 165, while that of the more sparsely settled State of Maine in the same period was only 120.

Correction of the Death-rate.—The death-rate of a city is obtained by taking the ratio of the deaths to the population; but, in many cities there are large institutions in which many deaths occur of persons who are not residents of such cities. There are also deaths of residents which occur in other places, while the persons are away from home. Correction should be made for such deaths. For example, in 1902, 600 persons died in institutions of Boston who were not residents, and their deaths should be credited to their proper places of residence. Again, the relative numbers of the population at each age differ much in different cities, and this fact materially influences the death-rate. If there is a large percentage of persons at the ages of 15 to 50 when the death-rate is not above 8 or 9 per thousand, then the general death-rate will be low, but if there is an excess of children under 5 and of old persons over 70 then the general death-rate will be high, other conditions being equal. It is customary in English cities to make corrections for these conditions, using the death-rate of the country at different ages as a standard of comparison.

VITASCOPE, n. *vī'ta-skōp* [from L. *vita*, life, and *scope*, view]: device by which pictures on kinetoscope films are enlarged and exhibited on a screen. In the mechanism there is a small lens nearest the exhibition-screen; behind this lens is a metal frame over which the picture to be reproduced is passed; behind this frame is a large lens, and back of all is a strong arc-light. The pictures to be reproduced are previously photographed for the purpose, the films containing any number of pictures, which successively unfold a panorama. As the film is made to pass, by electrical power and a series of wheels, over the frame behind the small lens, the light from the arc-lamp, passing through the large lens, where it is focused, projects the picture through the small lens upon the screen, in a highly magnified form, every detail of figure and action being repeated. A magnet suspended before the frame over which the film passes prevents the film from being melted by the focused rays of light from the arc-lamp. A small dynamo attracts this magnet when the film is set in motion by turning a current into the vitascope, the film in motion being in no danger of melting. The magnet is released and falls to its protecting place when the film again becomes stationary. If the photographs on the film are painted as they may be, the pictures produced on the screen will show corresponding colors.

VITEBSK, *vē-tĕbsk'*: government in w. Russia; bounded n.w. by Courland and Livonia, n.e. by the govt. of Pskov; 17,440 sq. m. The surface generally is hilly, though wooded plains, marshes, and lakes abound. The Dwina flows through V. for 466 m.; and on this river and its affluents, large quantities of timber are floated down to the port of Riga. The soil is not fertile, and the quantity of cereals grown is generally insufficient for local consumption. Flax and timber are chief articles of export. Ship-building is carried on on the Dwina; the lake-fisheries are profitable; and tanning is the most important industry. —V. is divided into 12 districts. Pop. 1,600,000.

VITEBSK': city of w. Russia, cap. of the govt. of V.; on both banks of the western Dwina; 389 m. s. of St. Petersburg, 345 w. of Moscow. It is an old town, covers a very large area, and contains many monasteries, churches, and synagogues. Manufactures are not extensive; and the trade—chiefly in grain, flax, hemp, tobacco-leaves, sugar, and timber—is carried on by Jews, who form the larger section of the population. V. is connected by railway with Dünaburg (q.v.) and Smolensk (q.v.). Pop. 67,000.

VITELLIUS, *vĭ-tĕl'ĭ-ŭs*, Aulus, Roman Emperor, 9th of the 12 Cæsars: A.D. 15, Sep. 24—69, Dec. (reigned 69, Jan.—Dec.); son of Lucius Vitellius, the prince of the sycophants who surrounded Caligula, but who, according to Tacitus, 'in his provincial administration exhibited the virtues of a former age.' Through his father's influence at court, V. became consul, A.D. 48, and afterward proconsul of Africa, where his administration gave satisfaction. He had been a companion of Tiberius at Capreæ,

and was equally a favorite with Caligula, Claudius, Nero, and Galba, the last of whom appointed him commander of the legions in Lower Germany, thinking his intense devotion to gastronomic pleasures would effectually prevent his becoming a rival. However, V. had not been a month in his new post till he had completely gained the affections of his soldiers by his good-natured familiarity and liberality (strongly contrasting with Galba's parsimony); and 69, Jan. 3, they took him from his tent, and proclaimed him emperor. This decision was adopted by the rest of the troops in Gaul; and two armies, under Valens and Cæcina, immediately set out to secure Rome, V. following leisurely. For his contest with Otho in n. Italy, see OTHO. The adherents of his predecessor were leniently treated, except that the centurions of Otho's army were put to death—an act which greatly offended his own supporters. V.'s journey to Rome was a curious specimen of a triumphant advance, the nominal conqueror being invariably muddled with liquor, and the soldiers of his army straggling about, committing excesses of all sorts with impunity. At last he reached Rome, and without loss of time proceeded, by right of his office as Pontifex Maximus, to deify Nero. The administration was mostly in the hands of the freedman Asiaticus, though P. Sabinus (brother of Vespasian) and the two generals who had gained for V. the imperial dignity were high in authority; and the government was marked by moderation, for V. was too far sunk in debauchery to be capable of tyranny. But he was not long allowed to disgust the respectable part of the citizens of Rome; for the legions of Pannonia and Illyricum, having proclaimed Vespasian emperor, advanced into Italy under Antonius Primus. They were opposed by the Vitellian troops, commanded by Cæcina; but, through the treachery of Cæcina, gained a decisive victory near Bedriacum, and another, on the following evening, over another Vitellian army which had marched to support the first. V., at this critical period of his fortunes, did not abate his swinish indulgences; but his brother Lucius, in the south, showed more energy, and defeated Vespasian's partizans in several battles. Meantime, the soldiers, enraged at the treachery of P. Sabinus and his allies among the senators and knights, stormed the capitol and slew Sabinus. From this time Rome was a scene of unintermitting violence and bloodshed, till the troops of Primus entered the city. V. was found wandering about his palace in stupid terror, and, after being ignominiously exposed in the streets, was killed by repeated blows, his head carried about Rome, and his body thrown into the Tiber.—For a complete sketch of his private life, see Tacitus's *Historia*, ii., iii., and Dion Cassius, 65; also Suetonius, *Vit. Duodec. Cæs.*

VITELLUS, n. *vĭ-tĕl'ŭs* [L. *vitellus*, the yolk of an egg]: the yolk of an egg. VITELLIN, *vĭ-tĕl'lĭn*, the albuminous substance of the yolk of eggs. VITEL'LINE, a. *-lĭn*, of or pertaining to the yolk of eggs; in *bot.*, of the color of the yolk of an egg.—The *Vitellus* or yolk of the egg of the domestic fowl consists of casein (forming 14 per cent), albumen (about 3 per cent), fats, some of which contain phosphorus (about 30 per cent), a little grape-sugar, and mineral constituents (about 1.5 per cent), in which there is great preponderance of potassium compounds and phosphates. Of the pigments of the yolk we know only that there is both a yellow and red pigment; and that one at least of them contains iron. As a food, the yolk is one of the most highly concentrated forms of nourishment. In pharmacy it is employed for administering substances insoluble in water (e.g., the oils and resins in form of emulsions). See EGG.

VITERBO, *vē-tĕr'bō:* city of central Italy, province of Rome; 1,200 ft. above sea-level, at the foot of Monte Cimino; 42 m. n.n.w. of Rome. It is picturesquely situated amid gardens and vineyards, and inclosed by walls and towers dating from the Lombard period. The streets are well built and are paved with large lava blocks, and there are numerous elegant fountains. Its Gothic cathedral contains the tombs of several popes, and is memorable as the scene where Guy de Montfort assassinated Prince Henry, brother of Henry III. of England. Among other attractive buildings are the churches, mostly rich in works of art, the bishop's palace, and the city halls. There are many monuments of antiquity in and around the city. Alum, vitriol, and sulphur abound in the neighborhood, and exquisite wines are produced. Pop. 22,000.

VI'TEX: a genus of trees or shrubs belonging to the *Verbenaceæ*, and widely distributed in warm climates. The leaves are opposite, and are usually palmately compound with 3 to 7 leaflets. The flowers are of medium size, with a short tube, and oblique, five-cleft limb, which is sometimes slightly labiate. They are arranged in more or less dense and branched cymes, and are purple, blue, white or yellowish in hue. The handsome, deciduous shrub, *Vitex agnus-castus*, native to the shores of the Mediterranean, has many popular names, such as Abraham's balm, or monk's pepper-tree, but is particularly known as the chaste-tree, or agnus-castus, from its supposititious virtues in the way of dispelling love, and preserving virtue. Its leaves are aromatic, its sap is said to be poisonous, and it is much cultivated on account of the paniculate cymes of bright. bluish-purple flowers; it is not hardy, however, north of Philadelphia.

Several species of vitex produce valuable wood, as, for instance, the lignum-vitæ of Queensland (*V. lignum-vitæ*), and the puriri, or New Zealand teak from *V. littoralis*. This last is a robust tree, sometimes 5 ft. in diameter, yielding short lengths, often curved, of a

brown, heavy, durable timber, suitable for shipbuilding and for other purposes, and considered to be imperishable in water. The flowers on its spreading branches are nearly an inch long, and are hairy, and dull-red in color. *V. capitata* is the bois lézard of upper South America. The evergreen, *V. pubescens,* and the *V. umbrosa,* of the West Indies, are known respectively as the tree-vitex, and as the boxwood or fiddle-wood. *V. trifolia* is known in India as the wild pepper-tree, and yields a sweet, greenish medicinal oil. The aromatic leaves of the *V. negundo,* of the same country, are believed to alleviate headache, and a vapor bath is prepared from them for the benefit of fever and rheumatism; while its ashes are largely employed as an alkali in dyeing.

VITIATE, v. *vĭsh'ĭ-āt* [L. *vitĭātus,* pp. of *vitĭārĕ,* to make faulty, to spoil—from *vitĭum,* a fault]: to make less pure or perfect; to taint; to spoil; to contaminate; to impair; to invalidate. VI'TIATING, imp. VI'TIATED, pp. VI'TIA'TION, n. *-ā'shŭn,* corruption; contamination; a rendering imperfect or invalid.

VITICULA, n. *vĭ-tĭk'ū-lă* [L.—dim. of *vītis,* a vine]: in *bot.,* a trailing stem, as of a cucumber.

VITICULTURE, n. *vĭt'ĭ-kŭl-tūr* [L. *vītis,* a vine; Eng. *culture*]: cultivation of the Vine (q.v.). The value of grapes, wine, raisins, etc., produced in grape vines, United States, 1900, was $14,050,937; number of vines, 182,333,064; pounds of grapes, 1,301,013,407; gallons of wine, 8,246,344. The three states having greatest values in grape-vine produce were California, $5,622,825; New York, $2,763,711, and Ohio, $992,745. California had 90,686,458 vines, producing 721,433,400 pounds of grapes and 5,492,216 gallons of wine. New York had 29,636,216 vines, producing 247,698,056 pounds of grapes and 290,365 gallons of wine. Ohio had 13,772,800 vines, producing 79,173,873 pounds of grapes and 350,615 gallons of wine.

In 1908, the world's total production of wine was 3,775,000,000 of gallons. France, including Algeria and Tunis, produced 1,710,000,000 gallons; Italy, 856,520,000; Spain, 428,000,000; Austria-Hungary, 192,000,000; Portugal, 109,000,000; and United States, 34,000,000 gallons. In the same year there were imported into the United States 5,443,782 gallons in casks; 628,428 dozens of bottles of still wines; and 366,669 dozen bottles of champagne.

VITILIGO, n. *vĭt'ĭl-ī'gō* [L. *vĭtĭlīgo,* a cutaneous eruption, lepros]: a cutaneous disease, consisting of white patches on the skin, caused by loss of the usual coloring matter. VITILIGOIDEA, n. plu. *vĭt'ĭl-ī-goy'dē-ă* [G. *eidos,* resemblance]: yellow patches sometimes met with round the eyelids and elsewhere on the skin.

VITIOUS, a. *vĭsh'ŭs* [the same as VICIOUS]: in *Scot. law,* illegal; unwarrantable, as in VITIOUS INTROMISSION,

an unwarrantable interference with the movable estate of a deceased person.

VITIS, n. *vī'tĭs* [L. *vitis*, a vine]: the typical genus of order *Vitaceæ* (q.v.).

VITORIA, *vē-tō'rē-â:* town in n. Spain, capital of province of Alava; on a gentle elevation, 70 m. w. of Pamplona, 234 n.n.e. of Madrid. The old town, the Villa-Suso, which occupies the top of the hill, consists of dark and tortuous streets; the new town is regularly laid out. There are several charming *alamedas*, or public walks, especially La Florida and El Prado. The Plaza Nueva, a square of 220 ft., was built 1791, and under its arcades is the favorite winter promenade. Brass and iron wares, earthenware, candles, paper, and linen goods, are manufactured, and a brisk general trade is carried on with towns inland. The plain around is extensive and fruitful. The climate is temperate and healthful. Pop. (1900) 30,701.

Wellington gained here an important victory over the French under Joseph Bonaparte and Jourdan, 1813, June 21. The numbers in this encounter were nearly equal. The French lost 6,000 killed and wounded, 150 cannon, with baggage, eagles, and an amount of booty in pictures, etc., which amounted to $5,000,000. The direct result of the battle was the retirement of the French from Spain. About this engagement Southey says the French 'were beaten before the town, in the town, through the town, out of the town, behind the town, and all about the town.' The combined loss of the British, Portuguese, and Spaniards was 4,900 men.

VITREO-ELECTRIC. See under VITREOUS.

VITREOUS, a. *vĭt'rĭ-ŭs* [L. *vitrĕus*, glassy, clear—from *vitrum*, glass—from *vidērĕ*, to see: It. *vitreo*]: pertaining to or consisting of glass; having the lustre or aspect of glass; glassy; produced by rubbing glass, as *vitreous* electricity. VIT'REOUSNESS, n. *-nĕs*, the state or quality of being vitreous. VITRESCENT, a. *vĭ-trĕs'sĕnt*, capable of being formed into glass; tending to become glass. VITRES'CENCE, n. *-sĕns*, the state or quality of being vitrescent; glassiness. VITRES'CIBLE, a. *-sĭ-bl*, that can be vitrified. VITRIC, a. *vĭt'rĭk*, of or pertaining to glassy substances. VITRIFAC'TION, n. *vĭt'rĭ-făk'shŭn* [L. *facĭō*, I make]: the act or process of converting into glass by heat and fusion. VIT'RIFAC'TURE, n. *-tūr*, the making of glass. VIT'RIFY, v. *-fī*, to convert into glass by the action of heat; to be converted into glass. VIT'RIFYING, imp. VIT'RIFIED, pp. *-fīd:* ADJ. having the surface coated with, or partially converted into, glass by the action of heat. VIT'RIFI'ABLE, a. *-fī'ă-bl*, capable of being converted into glass. VITREO-ELECTRIC, a. *vĭt'rē-ō-*, exhibiting positive electricity—applied to glass when rubbed. VITREOUS ELECTRICITY, positive electricity, or that which is excited by rubbing a glass body. VITREOUS

HUMOR, the globular transparent structure occupying the centre of the eyeball, being the largest of the transparent media of the eye.

VIT'RIFIED FORTS: remarkable stone inclosures bearing traces of the action of fire, found in various parts of Scotland, in Ireland, France, etc. They are usually on a small hill, overlooking a considerable valley, and consist of a wall inclosing a level area on the summit. The most remarkable feature is, that the wall is always more or less consolidated by the action of fire—in some cases only to the extent of giving a glassy coating to its inner side: in some instances the vitrification has been more complete, the ruins assuming the character of vast masses of coarse glass. About 50 structures of this kind are in Scotland, extending from Creich, in Sutherlandshire, to Kingarth, in the south of the isle of Bute. The largest, 750 ft. long and 150 ft wide, is in Argyleshire; but the strongest, with walls about 8 ft. high and 20 to 30 ft. thick, is the Tap o' Noth, in Aberdeenshire. Vitrified forts were noticed first by John Williams, in his *Account of Some Remarkable Ancient Ruins Lately Discovered in the Highlands and Northern Parts of Scotland* (1777). His observations led him to conclude that they were artificial structures intentionally vitrified by a partial melting of their materials. This view has been combated by others, who contend that the supposed forts were of volcanic origin—a supposition quite irreconcilable with their obviously artificial character. Samuel Hibbert, one of the secretaries of the Society of Antiquaries of Scotland, after careful observations, concluded that, while the structures were artificial, the vitrification was an accidental effect, which might have arisen from such causes as the frequent kindling of beacon-fires as signals of war and invasion, or of bonfires forming a part of festive or religious rejoicings. Others have held that the forts may have been built of wood and stone, and that the vitrified appearance is due not to design, but to the fusion which resulted from their having been set on fire by a besieging enemy. The view originally put forth by Williams is that now generally received, and supported by the principal British and continental authorities. Moreover, it has been found that in some cases where the most accessible materials for a stone fort are incapable of vitrification, stones more capable of being vitrified have been brought from a distance. One vitrified fort has been noted in the county of Cavan, Ireland, and four in the county of Londonderry. A single instance, the 'Camp of Péran' in Brittany, occurs in France. In this case, only the central portion, or core, of the wall is vitrified, and in it a Roman roofing-tile was found firmly attached to the melted stone. A number of the hill-forts of Bohemia have been found to be constructed with a core of vitrified stones occupying the centre of the walls.—Various signs indi-

cate that the vitrified forts are not of great antiquity —perhaps even as late as the first centuries of the Christian era. See *Archæologia Scotica,* IV.; McCulloch's *Highlands and Western Islands of Scotland;* Burton's *History of Scotland,* chap. 3; *Proceedings Soc. Antiq. Scot.,* VIII., 145; etc.

VITRINGA, *vē-trĭng'gâ,* CAMPEGIUS: eminent Dutch divine and commentator: 1659, May 16—1722, Mar. 31; b. at Leeuwarden, in Friesland. He studied at Franeker and Leyden, at which last place he received the degree D.D. in his 20th year. In 1681 he was appointed professor of oriental languages; and two years later received the chair of theology in the University of Franeker, where he died. Vitringa is regarded as one of the most learned and laborious divines of his age, and has left many excellent and erudite works, chiefly commentaries on portions of the Scriptures, nearly all in Latin; among his works are: *Commentarius in Jesaiam; Anacrisis Apocalypseos Johannis Apostoli; Commentarius in Jeremian; Commentarius in Zecharaiam; Vetus Synagoga; Dissertationes Sacræ; Typus Theologicæ Propheticæ;* etc.

VITRIOL, n. *vĭt'rĭ-ŏl* [F. *vitriol;* It. *vitriuolo,* vitriol —from L. *vitrum,* glass—from the appearance of blue and green vitriol]: sulphuric acid or one of its many compounds. VIT'RIOLATE, a. *-rĭ-ō-lāt,* reduced or converted to a vitriol. VIT'RIOL'IC, a. *-ŏl'ĭk,* pertaining to or obtained from vitriol; of the nature of vitriol. VIT'RIOLINE, a. *-ō-līn,* of or pertaining to vitriol. BLUE VITRIOL, sulphate of copper. GREEN VITRIOL, sulphate of Iron (q.v.); Copperas (q.v.): it occurs in nature in small amounts—e.g., in bituminous coal-beds. RED VITRIOL, a red or flesh-colored sulphate of iron; a sulphate of cobalt. OIL OF VITRIOL, sulphuric acid—so called because of its oily appearance, and because it was obtained originally from green vitriol or copperas. WHITE VITRIOL, sulphate of zinc: see ZINC.—*Vitriol* is the name applied by the early chemists to glass-like salts, distinguishing them by their colors into blue vitriol, green vitriol, and white vitriol. *Blue Vitriol* is still the popular name for sulphate of copper, which may be obtained on a large scale in various ways, but most simply by boiling copper in an iron pot with dilute sulphuric acid, by which is obtained a salt having the formula $Cu_2SO_4.5H_2O$, and crystallizing in oblique prisms of clear blue color, which are soluble in four parts of cold and two of boiling water, and when moistened redden litmus paper. It occurs native in small quantities from decomposition of copper sulphide. In large doses it acts as a powerful irritant poison, unless, as is frequently the case, it is rejected by vomiting. In small but repeated doses (as from half a grain, gradually increased to two grains, made into pills with conserve of roses) it acts as a tonic and astringent, and will often check the discharges in chronic diarrhea and dysentery, when other medicines have failed; and accord-

ing to Neligan, it has been found serviceable in croup by checking excessive bronchial secretion. It has been much employed in cases of epilepsy, and is a valuable remedy in chorea and other spasmodic diseases, especially when they occur in weak constitutions about the period of puberty. Its use in doses of 10 to 15 grains as an active emetic is mentioned in all works on materia medica; but sulphate of zinc, in a dose of a scruple, is as efficacious, and much safer. Externally, this salt in solution (varying from one to ten grains in an ounce of water) forms a good application to indolent ulcers, aphthæ, cancrum oris, and the sore throat in scarlatina; it is used also in chronic ophthalmia, and as an injection in cases of urethral or vaginal discharges. In the solid state it is used as a caustic to repress excessive granulations (proud flesh), to destroy warts, and to excite indolent ulcers.

Elixir of Vitriol is the old name for the aromatic sulphuric acid of the Pharmacopœia. It is a mixture of three ounces of sulphuric acid and two pints of rectified spirit, in which powdered cinnamon and ginger have been digested. Its uses in doses of 10 to 30 minims, in a wineglassful of water, are much the same as those of dilute sulphuric acid; but it is more agreeable to the taste, and sits more lightly on the stomach.

VITRO DI TRINA, *vĭt'rō dĭ trē'nâ:* beautiful kind of glass made by the Venetians in the 15th century. Its distinguishing character is a series of wave-like marks in opaque colors, but usually white, arranged more or less regularly in the substance of transparent glass.

VITRUVIAN SCROLL, *vĭ-trō'vĭ-an:* continuous scroll-work forming a kind of cresting, used in classical architecture.

VITRUVIUS, *vĭ-trū'vĭ-ŭs* (Mar'cus Vitru'vius Pol'lio): Roman architect and engineer, mentioned by Pliny and Frontinus, and noted as author of a famous work on architecture—*De Architectura.* From references to himself in his own work, it is inferred that he was born B.C. 76 or 80; that he received a liberal education, specially in studies for the profession of an engineer and architect; and that he was engaged in the African war B.C. 46, as superintendent of military engines. He seems to have had great repute as an architect, but not to have acquired wealth, though the patronage which Emperor Augustus was induced by his sister (probably *Octavia Minor*) to extend to him insured him comfortable subsistence. His only public work known was a basilica at Fanum. Vitruvius, in his book *De Architectura,* gives as his chief reason for writing it, the danger that, in the depraved architectural taste of the time, the beauty and correctness of the pure Grecian models would be neglected. The *De Architectura* is arranged in 10 books: the *first* contains a dedication to the emperor, a general view of architectural science, hints as to the proper subjects of study for young aspirants, and directions for building

cities; the *second* treats of the early history of architecture, and of its materials, with a sketch of the physical theories of various philosophers; the *third* and *fourth* treat of the erection of temples, and, in connection with this, of the four orders of architecture, Ionic, Corinthian, Doric, and Tuscan; the *fifth* treats of public buildings; the *sixth,* of private houses in town or country; the *seventh,* of the finishing and decoration of private buildings; the *eighth,* of water, the mode of discovering it, of obtaining it, and of conveying it in large supply; the *ninth,* of the principles of gnomonics, rules for dialling, and other subjects physical and astronomical; the *tenth,* of machines used in building and in military warfare, of the mechanical powers, of mills, engines for raising water, odometers, etc. To each book there is a preface; and from these is gathered what little is known of his history.—Vitruvius had great influence on architecture, from the Renaissance till comparatively recent times. There have been many editions of Vitruvius; the first was published with Frontinus's *De Aquœductibus,* Rome (about 1486), Florence (1496), Venice (1497). Rude wood-cuts were introduced into various subsequent editions, and the edition of Bode (Berlin 1800) has a volume of plates; but the best edition, that of J. G. Schneider (Leipsic 3 vols. 1807-8), is without illustrations. See Nohl's *Index Vitruvianus.*

VITTA, n. *vĭt'tă,* VITTÆ, n. plu. *vĭt'tē* [L. *vitta,* a band or filet worn round the head]: in *bot.,* a narrow elongated receptacle of aromatic oil, occurring in the fruit of *Umbelliferœ,* appearing in transverse sections of the fruit as brown dots between the pericarp and albumen. VIT'TATE, a. *-tāt,* striped, as some leaves.

VITTORIA, *vĭt-tō'rē-â:* inland town of Sicily, province of Siracusa; 18 m. n.w. of Modica, on the Camarana. It is quite a modern town and possesses little interest. The soil of its vicinity, however, is fertile in fruits and wines; bee-culture is carried on, and an active trade in silk and cattle. Pop. about 22,000.

VITULINE, a. *vīt'ū-līn* [L. *vitŭlīnus*—from *vitŭlus,* a calf]: belonging to a calf or to veal.

VITUPERATE, v. *vĭ-tū'pėr-āt* [L. *vitupĕrātus,* pp. of *vitupĕrārĕ,* to inflict censure upon, blame—from *vitĭum,* a fault; *parārĕ,* to make or get ready: It. *vituperare*]: to blame; to censure; to revile. VITU'PERATING, imp. VITU'PERATED, pp. VITU'PERA'TION, n. *-ā'shŭn,* abuse; blame; censure. VITU'PERATIVE, a. *-ă-tĭv,* containing blame or censure. VITU'PERATIVELY, ad. *-lĭ.* VITU'PERATOR, n. *-ă-tėr,* one who vituperates. VITU'PERABLE, a. *-ă-bl,* in *OE.,* deserving blame; censurable.

VITUS, *vī'tŭs,* ST., DANCE. See CHOREA.

VIVACE, a. *vĭ-vâ'chā* [It.]: in *music,* brisk and lively.

VIVACIOUS, a. *vī-vā'shŭs* [L. *vīvax* or *vīvācem,* long-lived—from *vivĕrĕ,* to live: It. and F. *vivace,* vivacious]:

lively; sprightly and active; in *OE.*, having vigorous powers of life. VIVA'CIOUSLY, ad. *-lĭ.* VIVA'CIOUSNESS, n. *-nĕs,* or VIVAC'ITY, n. *-văs'ĭ-tĭ,* life; animation; great liveliness and sprightliness of behavior; in *OE.*, tenaciousness or length of life.—SYN. of 'vivacious': cheerful; merry; gay; jovial; mirthful; sportive; animated; jocund; light-hearted.

VIVANDIÈRE, n. *vē-văng'dē-ăr* [F.—from mid. L. *vivanda,* provisions (see VIAND)]: on the *continent of Europe,* especially in France, female attendant who sells provisions, liquors, etc., to the soldiery: she is attached to a regiment, and wears its colors. The vivandiere often also ministers to the sick; and she is generally respected, each corps being extremely jealous of the honor of its vivandiere, and resenting the slightest discourtesy shown to her.

VIVARIUM, n. *vī-vā'rĭ-ŭm,* VIVA'RIA, n. plu. *-rĭ-ă,* or VI'VARY, n. *-vă-rĭ,* VI'VARIES, n. plu. *-vă-rĭz* [L. *vivārĭum,* a preserve, a pond—from *vivus,* alive; *vivĕrĕ,* to live]: an inclosure, cage, reservoir, vase, etc., for keeping animals alive in their natural state; a zoological garden or park; a *vivarium* for salt or fresh water animals is called an *aquarium;* a vivarium for birds is called an *aviary;* for bees, an *apiary;* for pigs, a *piggery;* for hens, a *hennery,* etc.

VIVA VOCE, *vī'vă vō'sē* [L., with the living voice]: by word of mouth; orally.

VIVE, int. *vēv* [F. *vive,* long live, hurrah; *vivre,* to live]: long live; success to. QUI VIVE, *kĕ vēv* [F. *qui,* who]: who goes there?—a challenge made by a sentinel. ON THE QUI VIVE, on the alert.

VIVERRIDÆ, *vī-vĕr'ĭ-dē:* family of *Carnivora,* having the body elongated, the claws partly retractile, the pupil of the eye circular during the day, and not contracted into a vertical line, as in the *Felidæ*; and, in general, with a strong musky odor, proceeding from a secretion in a pouch near the anus. To this family belong the civet, genet, ichneumon, etc.

VIVES, n. *vīvz* [F. *avives,* the vives]: a disease in animals, especially in horses, seated in the glands under the ears; also spelled FIVES, but less correctly.

VIVIANITE, n. *vĭv'ĭ-ăn-īt* [after *Vivian,* an English mineralogist]: a mineral having the composition of a hydrous phosphate of ferrous iron, $Fe_3(PO_4)_2 + 8H_2O$. It often occurs in globular masses showing stellate-foliated structure, also earthy, or as an incrustation. Distinct crystals are comparatively rare. They are monoclinic prisms, usually transparent and of metallic-pearly to vitreous lustre. They exhibit strong pleochroism, and green, steel-blue to indigo-blue colors. The cleavage parallel to the clinopinacoid is highly developed. The hardness of vivianite is 1.5 to 2 and its specific gravity is

about 2.63. It is often associated with pyrite, pyrrhotite or limonite and is also found in the clay beds, peat bogs and the green-sand formations. Many curious occurrences are noted in mineralogical books. The original locality in Cornwall, England, has produced many fine specimens, also Australia, Allentown and Mullica Hill, New Jersey.

VIVID, a. *vĭv'ĭd* [L. *vivĭdus*, living, animated—from *vivus*, alive; *vivĕrĕ*, to live: It. *vivido*]: true to the life, as a description; exhibiting the appearance of life and freshness; lively; sprightly; forming brilliant images, as colors. VIV'IDLY, ad. *-lĭ*. VIV'IDNESS, n. *-nĕs*, the quality of being vivid; sprightliness; also the rare form VIVIDITY, n. *vĭ-vĭd'ĭ-tĭ*. SYN. of 'vivid': lucid; clear; bright; luminous; splendid; brilliant; lustrous; strong; intense; striking; quick; active.

VIVIFY, v. *vĭv'ĭ-fī* [F. *vivifier*—from L. *vivus*, alive; *facĭō*, I make]: to endue with life; to animate; to make alive. VIV'IFYING, imp. VIV'IFIED, pp. *-fīd*. VIVIFIC, a. *vĭ-vĭfĭk*, giving life; reviving. VIVIFICATION, n. *vĭv'ĭ-fĭ-kā'shŭn*, the act of giving life. VIV'IFICA'TIVE, a. *-tĭv*, tending to vivify; vivifying.

VIVIPAROUS, a. *vī-vĭp'ă-rŭs* [L. *vivus*, alive; *parĭō*, I produce or bring forth]: producing young alive; having young which maintain vital connection with the parent until birth in a comparatively advanced stage of development: opposed to *Oviparous;* in *bot.*, producing young plants from a bud or seed attached to the parent plant; attached in some unusual way to the parent, as young plants. VIVIPARITY, n. *vĭv-ĭ-păr'ĭ-tĭ*, state or quality of being viviparous; also VIVIP'AROUSNESS, n. *-nĕs*.—VIVIPAROUS FISH, term sometimes applied to a few species of fishes (see FISHES: REPRODUCTION) which properly are *ovoviviparous*, i.e., hatching the eggs within the ovary: an example is in the Viviparous Blenny of the British coasts. But it is the common characteristic of a whole family of the order *Pharyngognathi*, therefore designated by the popular name Viviparous Fish, and by the scientific name *Embiotocidæ* [from the Greek, signifying *viviparous*]. The general aspect of fishes of this family is somewhat perch-like; scales cycloid, gill-covers entire; lips thick. On the n.w. coast of America from San Francisco to Sitka, species of this family are very abundant. They come into shallow water near the coasts, when the time approaches for producing their young, about midsummer. They swim in vast shoals close to the surface, and have a peculiar habit of leaping high out of the water when alarmed, of which the Indians take advantage to capture them, by striking the water violently with their paddles, and uttering yells. The terrified fish leaping out of the water, many fall into the canoes. The Indians capture these fishes also by thrusting a spear with four barbed points into the midst

of a dense shoal. They can be easily taken by nets, but are not of great value for the table.

VIVISECTION, n. *vĭv'ĭ-sĕk'shŭn* [L. *vivus*, alive; *sectĭō* or *sectĭōnem*, a cutting—from *seco*, I cut]: the dissection of an animal while alive; physiological experiments on living animals. VIV'ISEC'TIONIST, n. *-ĭst*, one who advocates the practice of vivisection. VIV'ISEC'TOR, n. *-tĕr*, one who dissects animals while alive.—*Vivisection* is practiced with the view (1) of increasing physiological knowledge; (2) of confirming known facts; (3) of giving dexterity in operative surgery. Strictly, vivisection implies only 'cutting,' but the term is now extended to include all kinds of experiments on living animals. The practice of vivisection can be traced back almost to the earliest periods of medicine and surgery, and was in vogue in the Alexandrian School. In recent years much opposition has been excited against it, and those adverse to the practice, the so-called antivivisectionists, have endeavored to restrict or wholly abolish vivisection by harsh measures. It is alleged that animal experimenters practice much needless cruelty, but even apart from this, some have taken the extreme view that any experiments on living animals, with the object of advancing medical and surgical knowledge, are, on moral grounds, unjustifiable. Those who advocate vivisection point to the gains which have accrued to physiology, and also directly to the healing art, by experiments on living animals. The circulation of the blood, and the existence of the lacteals, were thus established; and nearly all our present knowledge of the functions of the nervous system has been thus obtained, and could never have been afforded by the most minute anatomical research. In consequence of the knowledge thus obtained we no longer divide a motor nerve, and thus paralyze the face, in the hope of relieving tic douloureux; while we now see our way to a more rational mode of treating epilepsy, various obscure forms of paralysis, etc. Without vivisection we could never have clearly understood the causes of the sounds of the heart, and without the knowledge of these the stethoscope would have been useless in the diagnosis of cardiac diseases; nor should we without vivisection have known anything of the true nature of many mysterious diseases. The Hunterian treatment of aneurism by ligature, which has saved hundreds of human lives, was worked out by experiments on living animals, and so have been the improved methods of the transfusion of blood.

The study of anæsthetics, which, after prolonged investigation, led to the introduction of chloroform, was unquestionably accompanied by the suffocation of many animals; but the vast amount of misery spared to humanity by the general introduction of chloroform into surgical and midwifery practice more than counterbalances the pain inflicted in the experiments. The discovery of the healing power of diphtheria antitoxin whereby

countless lives of infants and children suffering from this disease have been cured, is a direct outcome of animal experiments. If vivisection were abolished the manufacture of antitoxin would perforce cease. The lower animals themselves have shared in the benefit, for (to mention only one instance) the discovery of the cause of anthrax in sheep made by means of vivisection has resulted in not only saving the lives of vast numbers of these animals (an enormous economic gain), but in preventing the sufferings of sheep attacked by the disease. By experiments on living animals must be sought the solution of such questions as the best means of restoring to life persons apparently drowned; why chloroform sometimes kills; and how those suffering under apparently fatal effects can be best recovered. These and similar considerations lead the advocates of vivisection to the conclusion that experiments on living animals, performed—always with care to avoid needless pain—with the object of advancing medical, surgical, or toxicological knowledge, and of thereby relieving human and animal suffering, or prolonging human life, are not only justifiable, but are a matter of duty.

VIXEN, n. *vĭks'n* [feminine of Fox, which see: Ger. *füchsinn,* a she-fox]: a she-fox; a name in reproach applied to a woman; an ill-tempered, quarrelsome woman. Vix'enish, a. *-ĭsh,* like a vixen; shrewish. Vixenly, a. *vĭks'n-lĭ,* having the temper of a vixen.

VIZ, usually pronounced *namely,* a contr. of the L. *videlicet* [*vī-dĕl'ĭ-sĕt*]: that is; namely.

VIZAGAPATAM, *vē-zâ-ga-pa-tâm':* city of British India, capital of the district of Viz, in the presidency of Madras, on a small arm of the Bay of Bengal. It has a good harbor, sheltered on the s. by a promontory 1,500 ft. high, called the Dolphin's Nose, which is separated from the town by a small river emptying into the bay at this point, and admitting at spring-tide vessels of 200 or 300 tons. Viz supports a large number of schools, has a hospital and dispensary, a library and reading-room, and is the residence of a Roman Catholic vicar apostolic. It exports grain and sugar, and manufactures silver filagree-work and ivory and horn toys. Pop. 30,000.

VIZARD, n. *vĭz'ĕrd* [see Visor]: in *OE.,* a mask; a visor: V. in *OE.,* to mask. Vizor. See Visor.

VIZCAINO, Sebastian: Spanish navigator: b. Huelva, about 1550; d. Acapulco, Mexico, about 1615. After being prominent in Mexico he headed exploring expeditions from Acapulco to Lower California, 1596-7, and in 1602-3 along the California coast to latitude 43°, discovering the bay which he called Monterey, and sent a vessel which appears to have reached the mouth of the Columbia. He also sailed to Manila and Japan, 1611-14, carrying Franciscan missionaries to Japan, and was the earliest to attempt to establish commercial relations be-

tween Spain and Japan. His reports of his voyages to California were printed in Torquemada's *Monarquia Indiana* (1615), and the greater share of his narratives, including that of his voyage to Manila, was included in De Navarrete's *Coleccion de Viajes y Descubrimientos* (1625-9).

VIZETELLY, *vĭz-ė-tĕl'ĭ*, Edward Henry ('Bertie Clare'): English journalist and war correspondent, son of H. R. Vizetelly (q.v.): b. Chiswick, England, 1847, Jan. 1; d. London, 1903, Apr. 13. He was educated at the Imperial Lyceum, Saint Omer, France. At the outbreak of the Franco-Prussian war he became special correspondent for the New York *Times* and the London *Daily News*, served as orderly officer on the staff of Garibaldi, and was present at Dijon and at Langres; subsequently he engaged in the Kabyle insurrection of 1871, served in the Russo-Turkish war of 1877-8 and in the Greek insurrection of the latter year. He founded the Cyprus *Times* in 1881 and the *Times of Egypt* at Alexandria in 1882. At the bombardment of Alexandria on July 11-12, 1882, he was the only Englishman in the city, and during the firing sent half-hourly despatches to London. In 1888 he commanded the New York *Herald* relief expedition sent in search of Stanley in Africa, and met him in East Africa in 1889. He was the author of *Reminiscences of Bashi Bazouk; From Cyprus to Zanzibar; The Warrior Woman.*

VIZETELLY, Ernest Alfred: English journalist and editor, son of H. R. Vizetelly (q.v.): b. London, 1853, Nov. 29. He was completing his education in Paris when the Franco-Prussian war broke out and he became correspondent for the Yorkshire *Post*. After the close of the war he accompanied his father in the capacity of artist through Austria, Spain, Portugal, and Italy until 1886, when he joined the editorial staff of Vizetelly & Company. Subsequently he engaged in journalism, and has translated into English the greater part of Zola's works. As a novelist he has written *The Scorpion* (1894); *A Path of Thorns* (1901); and *The Lovers' Progress* (1902). He edited an edition of *The Heptameron, English Bibliophilists,* planned by his father (5 vols., 1894); his other publications include: *The True Story of Chevalier d'Eon* (1895); *Bluebeard, Comorre the Cursed,* and *Gilles de Rais* (1902); *Emile Zola, a Biography* (1904).

VIZETELLY, Francis (Frank) Horace: son of H. R. Vizetelly, American editor and encyclopedist: b. London, 1864, Apr. 2. He was educated at the Lycée Baudard, Nogent-sur-Marne, France, and at Arnold College, Eastbourne, Sussex. From 1888 to 1891 he was engaged in business with his father at London, and in the latter year came to the United States. In 1891 joined the editorial staff of the 'Standard Dictionary,' for which he prepared the definitions on wines, and from the date of

the publication of that work was the assistant of the editor-in-chief in all subsequent editions issued, revising the entire work for the edition of 1903, when he became associate editor. During 1893-4 he filled the position of associate editor of the *Home and Country Magazine*, was revising editor of the *Columbian Encyclopedia* in 1896, of the *Cyclopedia of Classified Dates* in 1899, and also was one of the editors of Hoyt's *Cyclopedia of Practical Quotations*. He investigated in 1901 the conditions prevailing in the Boer detention camp at Bermuda, the only civilian accorded that privilege by the British authorities, and published his report in the leading American and English newspapers. He is secretary of the editorial board of the *Jewish Encyclopedia* and manager of the editorial department of that undertaking. Among his writings are: *The Story of the Wheel* (1898); *The Fan in Romance and History* (1898); *The History of the Glove* (1899); *The Boer as a Prisoner of War* (1901); *The Crime of the Congo* (1903); etc.

VIZETELLY, Henry Richard: English newspaper proprietor, editor, publisher and writer: b. London, 1820, July 30; d. Tilford, near Farnham, England, 1894, Jan. 1. He came of a family of printers and stationers, was educated at Clapham and at Chislehurst, and was later apprenticed to a wood-engraver, an art in which he became proficient, his most notable work as an engraver being a series of illustrations drawn by Birket Foster for Longfellow's *Evangeline*. He took a prominent part in founding *The Illustrated London News* in 1842, and was one of the founders of the *Pictorial Times* in 1843, a pioneer enterprise in illustrated journalism, published the first English edition of *Uncle Tom's Cabin* in 1853; established the *Illustrated Times* in 1855; the *Welcome Guest* in 1858; and in 1865-76 was correspondent of the *Illustrated London News* at Paris and at Berlin. He was appointed representative of the British government on wines at the Vienna Exposition in 1873 and at Paris in 1878, and for his labors at the former was created by the Austrian emperor chevalier of the Order of Franz-Joseph of Austria. In 1880 he established a publishing house in London, and engaged in issuing translations of the works of foreign authors, chiefly Russian and French, and in 1884 began to publish translations of the works of Emile Zola. The literal translation of the works of the novels of the French realist, however, aroused a storm of protest, and in 1888 he was indicted on the charge of publishing obscure libels, and, on the advice of counsel, pleaded guilty and agreed to withdraw the edition of Zola's works. Thereupon he was fined £100 ($500) and required to enter into his own recognizances to be of good behavior for a period of six months. In 1889, in harmony with his understanding of the undertaking given, he decided to issue an expurgated edition of the works of Zola. Notwithstanding the deletion of all the

passages to which objection had been raised, he was indicted a second time, and, being then 71 and broken in health, he, following advice of counsel, again pleaded guilty, and was sentenced to three months' imprisonment as a first-class misdemeanant. His writings include: A series of monographs on wines, entitled *Wines of the World* (1875); *Facts about Sherry* (1876); *Facts about Champagne* (1879); *Facts about Port and Madeira* (1880); *The Story of the Diamond Necklace* (2 vols., 1867); *Berlin under the New Empire* (2 vols., 1879); *Paris in Peril* (3 vols., 1882); and two volumes of literary reminiscences; *Glances Back through Seventy Years* (1893); etc.

VIZIER: a title given to high political officers in the Turkish Empire and other Mohammedan states. In Turkey the title is given to the heads of the various ministerial departments into which the divan or ministerial council is divided. The president of the divan or prime minister is known as grand vizier.

VLAARDINGEN, *vlâr'dĭng-en:* town of S. Holland, about 5 m. w. of Rotterdam; near the New Maas. It has a good haven and sends annually a large fleet of vessels to the herring-fishery, besides carrying on a considerable shipping-trade. Pop. 9,520.

VLACHS, or WAL'ACHS, WAL'LACKS. See ROUMANIA.

VLADIKAVKAZ, *vlâ'dē-kâv-kâz'*, or WLADIKAWKAS, *vlâ'dē-kâv-kâs':* chief town of the province of Terek, Ciscaucasia, in Russia; at the foot of the main Caucasus chain, and at the opening of the valley of the Terek. It is the terminus in this direction of the Russian railway system, and is on the only carriage road through the pass to Tiflis and the south of the mountains.—Pop. (Cossacks, Armenians, and a motley representation of various Asiatic races) (1900) 45,000.

VLADIMIR, *vlâ-dē'mēr:* government of Russia: bounded e. by the government of Nijni-Novgorod, s.w. by that of Moscow; 18,864 sq.m. The surface is level or undulating; the soil consists chiefly of clay or sand, fertile only in exceptional spots. The principal rivers are the Oka (navigable through its course of 85 m. through this government) and its tributaries, of which the chief is the Kliasma, a navigable stream. Of the numerous small lakes, that of Peryaslavl (5 m. long) is remarkable for productive fisheries, and is famous in history as being the cradle of the Russian fleet—the scene of the boyhood experiments of Peter I. in navigation. After St. Petersburg and Moscow, Vladimir is the most actively industrious government in the Russian empire. Of its manufactured goods, cotton-yarn and cloth, chintz and dyed goods, linen, glass, iron and brass wares, chemicals, paper, etc., amounted in value (1900) to more than 88,000,000 roubles (=$55,000,000). The inhabitants are also much employed in painting ikons or sacred pictures, in knitting

stockings used in Russia and Siberia, and in numerous other petty trades, whose total value amounted (1884) to about 63,000,000 roubles (=$39,000,000). Hemp is successfully grown for use in local manufactures and for export to Archangel and St. Petersburg. Forests, mostly of pine, form a border round the government.—In the 9th c. the country was inhabited by Finns; and though it was subsequently conquered and settled by the Slavonians, traces of the original inhabitants are still found. Pop. 1,600,000.

VLADI'MIR: town of Great Russia; capital of the government of Vladimir; on the high and wooded left bank of the Kliasma; 125 m. n.e. of Moscow.' It was founded in the 12th c., during the ascendency of the Dukes of Vladimir, and was the capital of Russia till 1328. It contains many historical remains, as the Kreml; the 'Golden Gate,' built 1158; ruins of old fortifications, and many ancient churches. The ecclesiastical seminary is important. From 1157 to 1328 it was the residence of the Russian grand princes. It was twice captured and sacked by the Tartars. Its trade is chiefly fruit, particularly cherries, for which it is famous. Pop. about 30,000.

VLADI'MIR (Vladimir Sviatoslavitch): first Christian sovereign of Russia: reigned 980-1014; d. 1014. On the death of his father (972), Vladimir, though illegitimate, received Novgorod as his share of the heritage; but was driven out by Jaropolk, who had already murdered the third brother, Oleg. However, Vladimir, aided by a body of Varangians (from Scandinavia), returned and overcame Jaropolk, by whose assassination (980) he became sole ruler in Russia. Ridding himself of his dangerous allies by persuading them to take service with the Byzantine emperor, he next recovered by force from the Poles the provinces of which they had deprived his brother, and subdued the revolted tribes. Russia at this time was an ill-compacted empire; the various Slavic tribes within its boundaries acknowledged the sovereignty of the Russian princes solely by payment of tribute, and that only when the princes were powerful enough to enforce it; hence it was the custom for the princes personally or their delegates to go their regular rounds after the fashion of tax-collectors, with a large armed retinue. Vladimir seeking to increase the central authority, erected at his cap., Kiev, the idol Perun (Thunder), the supreme divinity of the Slaves, with the images of inferior deities, Slave and Finnish. But a few years brought a remarkable change; many of Vladimir's subjects were Greek Christians; his mother, Olga, had become one; besides, he wished to be allied with the Byzantine imperial family; and moved by these and other reasons of personal or patriotic ambition, he resolved to turn Greek Christian. His mode of arriving at conversion and matrimony was as curious as effective; first he attacked the Byzantine

Empire, then sent an embassy to Constantinople, promising peace and his conversion, in exchange for the hand of Anna, sister of Constantine IX.; threatening war in case of refusal. His demands were gladly complied with; and after his marriage and baptism at Kherson 988, he returned to Kiev, destroyed all the idols, and commanded his subjects to be baptized. They had not the slightest objection to be baptized, if their feared and admired prince wished it; and for days the Dnieper was crowded with applicants for the first testing ordinance of Christianity. It could not have been expected that a conversion managed in such a fashion would affect the manners and conduct of such an arbitrary, violent, and daring prince as Vladimir; yet from 988 he appears to have undergone a thorough mental and moral transformation; churches were built, schools established, capital punishment was supplanted by a fine, and such excessive lenity shown to all criminals that in the interests of good government it was found necessary to remonstrate with the thoroughgoing convert. Formerly, the wisdom and valor for which he was renowned were equalled by his licentiousness, so that the chronicles had more than one reason for saying that 'he was like unto Solomon;' but the strictest chastity characterized the latter part of his life; and his charity to the poor and personal forbearance were extreme. He died three years after his wife Anna. The Russian Church has decreed him the epithets 'saint,' and 'equal of the Apostles.'

VLADI'MIR II. (Vladimir Vsevolodovitch), surnamed *Monomachus:* grand-prince of Kiev, and Russian sovereign: 1053-1125 (reigned 1112-25): great-grandson of Vladimir Sviatoslavitch. His father being a younger son, there seemed little chance of Vladimir's attaining power in his own country; and he led a band of auxiliaries to join Boleslas II. of Poland in his wars with Bohemia; gaining such renown as on his return ranked him at the head of Russian warriors. Vladimir's father having succeeded to the grand principality of Kiev (1078), Vladimir used his opportunity to wrest from their lawful possessors, Smolensk, Tchernigov, and Novgorod; though some years afterward, his cousin Oleg, the dispossessed prince of Tchernigov, with aid of the Polotzee or Cumans (a Turkish nation at that time the terror of the Russians), recovered his dominion. Vladimir having subsequently routed the Polotzee in several engagements, became so popular, that 1112 he was chosen grand-prince of Kiev. He showed eminent qualities as ruler and warrior. His reign was characterized by maintenance of internal tranquility, improvement of old towns and building of new, and encouragement of commerce; also by his successful campaigns against the Tchudes, Poles, Polotzee, and Bolgars (a Mohammedan commercial people settled on the Volga). Vladimir's fame, however, rests mostly on his writings, which present an in-

teresting picture of the internal life of Russia in the 11th c., and indicate the earnest practical influence of the newly introduced Christianity. Vladimir's mother was a daughter of Constantine Monomachus; and Alexis Comnenus, who wished to be on good terms with his powerful northern neighbor, is said to have sent him the crown, sceptre, and sword of his grandfather, which are still shown as such, and are employed in the coronation of the czar.

VLA'DISLAS, or VLA'DISLAZ, or ULA'DISLAS. See LADISLAS.

VLADIVOSTOK, *vlâ-dē-vŏs-tŏk'*: town of Asiatic Russia, and the chief naval station of Russia on the Pacific; on the w. shore of the peninsula Muravioff-Amurskiy; on the Gulf of Peter the Great, in the Sea of Japan; lat. 43° 7′ n.; long. 131° 55′ e.; near the Corean frontier. It has one of the finest harbors in the world, has an arsenal, and is the terminus of the overland part of the telegraph by Irkutsk and Kiachta, also of the great Siberian railway. Ice-breaking steamers keep the harbor open in winter. There are large ship-building yards and dry-docks, waterworks, steamship connection with ports of Japan, China and Corea, and with Seattle, U. S. The fortifications are very powerful.—Pop. (1901) 30,000.

VLEI, or VLY, n. *vlī* or *flī* [Dut. *vlei*, a marsh]: in *s. Africa*, a marsh; a swamp; any lodgment of surface-water; a reedy, wet hollow; the stream which drains a marsh (term used in some parts of New Jersey and New York.

VOCABLE, n. *vō'kă-bl* [L. *vocabŭlum*, a designation, a name—from *voco*, I call: It. *vocabolo*]: a name; a word; a term. VOCABULARY, n. *vō-kăb'ū-lėr-ĭ*, a collection of words, especially of a particular author, arranged in alphabetical order and briefly defined; a word-book; the words of a language, or the stock of words used by a particular person. VOCAB'ULIST, n. *-lĭst*, compiler of a vocabulary.

VOCAL, a. *vō'kăl* [F. *vocal*—from L. *vocālis*, sounding, speaking—from *vox* or *vōcem*, a voice: It. *vocale*]: having voice; consisting of or uttered by the voice; uttterable by the voice; made by the voice; sounding, as if in speech. VO'CALLY, ad. *-lĭ*. VO'CALNESS, n. *-nĕs*, the quality of being vocal. VOCALIC, a. *vō-kăl'ĭk*, consisting of voice or vowel sounds. VOCALIZE, v. *vō'kăl-īz*, to form into voice; to utter distinctly with the voice; to practice singing on the vowel sounds. VO'CALIZING, imp. *-ī-zĭng*. VO'CALIZED, pp. *-īzd*. VO'CALISM, n. *-ĭzm*, vocalization. VO'CALIST, n. *-ĭst*, a singer as distinguished from an instrumentalist. VO'CALIZA'TION, n. *-ĭ-zā'shŭn* [F.—L.]: the act or operation of making vocal; voice-utterance.

VOCALION, n. *vo-kā'lĭ-on* [from *vocal*]: a harmonium with broad reeds that have a tonal quality like that of

the pipe-organ. It has charming variety and purity of tone, and approaches the organ in force and richness of sound.

VOCATION, n. *vō-kā'shŭn* [F. *vocation*—from L. *vocātus*, pp. of *vocārĕ*, to call]: *literally*, a call; a summons; hence, a calling or trade; employment; an occupation. VOCATIVE, n. a. *vŏk'ă-tĭv* [L. *vocatīvus*]: in *gram.*, applied to the case or form of a word in which a person or thing is addressed or invoked: thus, *domine*—meaning 'O lord,'—is said to be the vocative of the Latin word *dominus*, 'lord,' 'master.' The vocative, however, is now regarded as a noun-stem used interjectionally, and not as a true case.

VOCIFERATE, v. *vō-sĭf'ėr-āt* [L. *vociferātus*, pp. of *vociferāri*, to cry aloud—from *vox* or *vōcem*, a voice; *fero*, I carry: It. *vociferare;* F. *vociférer*]: to utter with a loud voice; to exclaim; to shout; to bawl. VOCIF'ERATING, imp. VOCIF'ERATED, pp. VOCIF'ERATION, n. *-ā-shŭn*, violent outcry; clamor. VOCIF'EROUS, a. *-ėr-ŭs*, clamorous; noisy. VOCIF'EROUSLY, ad. *-lĭ*. VOCIF'EROUSNESS, n. *-nĕs*, the quality of being vociferous; clamorousness.—SYN. of 'vociferation': outcry; clamor; cry; exclamation; uproar; shouting; acclamation; tumult; bawling.

VODKA, n. *vŏd'kă* [Russ. *wodka, vodka*, brandy; a diminutive of *woda, voda*, water]: a kind of whisky obtained by distillation from rye, and sometimes from potatoes, and used in Russia as an intoxicant.

VOE, n. *vō* [Icel. *vör*]: a fiord; a creek; a bay.

VO'GELWEI'DE. See WALTHER VON DER VOGELWEIDE.

VOGEL, SIR JULIUS, Australasian statesman: b. London 1835, Feb. 24; d. near there 1899, March 12. He was educated at the London University College School and at the Royal School of Mines, and in 1851, attracted by the discoveries of gold in Australia, went to Melbourne. He engaged in journalism, and in 1861 established in Otago, New Zealand, the *Daily Times*, the first newspaper in that colony. In 1863 he entered the New Zealand House of Representatives and in 1869 he was appointed colonial treasurer, and subsequently was postmaster-general, commissioner of customs, and prime minister. He resigned the latter office in 1876 and was agent-general for New Zealand in London in 1876-81. In 1884 he re-entered New Zealand politics, was elected to Parliament and again appointed treasurer, but in 1888 resigned and returned to England. He was afterward engaged under the New Zealand government in London until his death. He greatly furthered immigration to New Zealand, was instrumental in building railways, was active in bringing about the Australian federation, and secured the passage of a law for inscribing colonial stocks. He was knighted in 1875. His writings

include: *Great Britain and Her Colonies* (1865); *Official Handbook of New Zealand* (1875); *A. D. 2000*, a novel, etc.

VOGHERA, *vō-gā'râ:* city of n. Italy, prov. of Pavia; on a fertile elevated plain, in a district rich in vineyards, orchards, and cornfields, 24 m. e.n.e. of Alessandria by railway. The Via Emilia passes through the town, and divides it into two parts. There are several handsome squares, of which that of the Duomo is the chief; the streets are adorned with porticoes; and there is an old castle, built by Galeazzo Visconti 1372. Silks, linens, canvas, and leather are manufactured.—Pop. 10,964.

VOGLER, *fō'glĕr,* Georg Joseph: German musician and composer, known as the Abbe Vogler; b. Würzburg 1749, June 15; d. Darmstadt 1814, May 6. He studied at Bamberg, Mannheim, Bologna, and Padua; was ordained priest at Rome in 1773; and made Knight of the Golden Spur, and prothonotary apostolic and chamberlain to the pope. Returning to Mannheim in 1775 he established there his first school of music. From 1786-99 he was nominally resident at Stockholm, where he conducted another Tonschule; but he was constantly touring Europe as a performer on the organ. In 1807 he settled at Darmstadt as kapellmeister, and there conducted his most successful school, at times giving concerts in German cities. Vogler made a great stir in his time as theorist and organist, not being excelled on the instrument.

VOGT, *fōçht,* Karl, m.d.: philosopher; b. Giessen, Hesse-Darmstadt; 1817, July 5; d. Geneva, Switzerland, 1895, May 5. He studied chemistry under Liebig at Giessen, then physiology and anatomy in Berne, where he graduated in medicine. He was collaborateur with Agassiz at Neuchâtel, 1839-44; then spent two years in Paris, and 1847 became prof. of zoölogy at Giessen. He was a member of the Frankfort parliament 1848; and being implicated in the revolutionary troubles of that year, returned to Switzerland. He became prof. of geology at Geneva 1852. Vogt headed a scientific expedition to the North Cape 1861. His works include: *Physiologische Briefe* (1845-6); *Ocean und Mittelmeer* (1848); *Die Säugethiere in Wort und Bild* (1883); etc.

VOGUE, n. *vōg* [F. *vogue,* course of a ship—from It. *vogare;* Sp. *bogar,* to row or pull at an oar: OHG. *waga,* a wave]: the mode or fashion prevailing at any particular time; mode; custom. In vogue, in fashion.

VOGUE, *vō-gü-ā,* Charles Jean Melchior, Marquis de, French archæologist: b. Paris 1829, Oct. 18. He was a student of Oriental religion, languages, and art, traveled in Syria and Palestine in 1853-4 and 1861-2, was ambassador at Constantinople in 1871-5, and from then until 1879 occupied that office at Vienna. He became commander of the Grand Legion of Honor in 1879, and

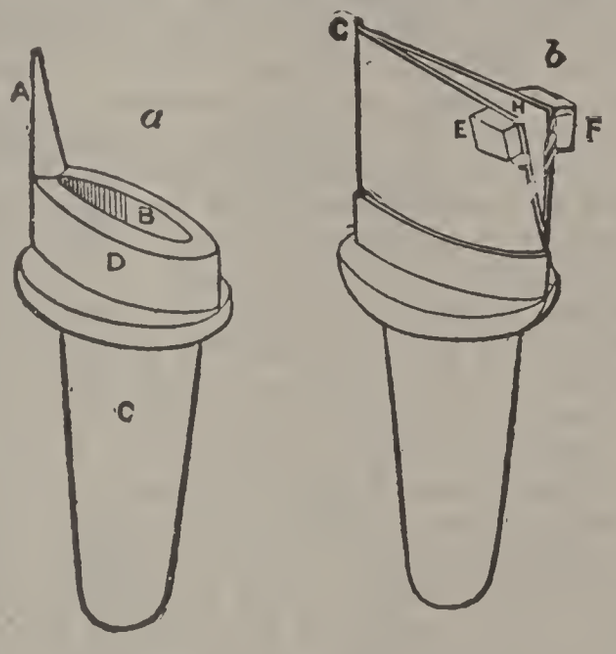
was elected to the French Academy in 1901. His publications include: *Les Eglises de la Terre-Sainte* (1859); *L'architecture civile et religieuse dans la Syrie Centrale* (1865-77); *Inscriptions semitiques* (1869-77); *Mémoires de Villars* (1889); *Le Duc de Burgoyne et le Duc de Beauvilliers* (1900); etc.

VOGUE, Eugene Marie Melchior, Vicomte de, French critic and historian: b. Nice, France, 1848, Feb. 25. He was educated at Paris, served in the Franco-Prussian war, entered the government service in the department of foreign affairs in 1871, was attaché at Constantinople in 1873, secretary of the legation at Saint Petersburg in 1876, and in 1882 resigned to enter upon a literary career. He was elected to the Academy in 1888 and in 1893-8 was député de l'Ardéche. His publications include: *Syrie, Palestine, Mont Athos* (1876); *Les portraits du siècle* (1883); *Le Romar russe* (1886); *Cœurs russes* (1894); *Jean d'Agrène* (1898); *Le rappel des ombres* (1900); etc.

VOICE, n. *voys* [F. *voix;* OF. *vois,* voice—from L. *vox* or *vōcem,* a voice]: sound from the mouth; the tone or character of uttered sounds; opinion or choice expressed; a vote; language; mode of expression; command; in *gram.,* particular mode of inflecting verbs (see Verb): V. to regulate the tone of, as an organ-pipe; give utterance or expression to, as to *voice* the sentiments of the community; to declare; to rumor; to report; to vote; adjudge by acclamation. Voic'ing, imp.: N. the act of giving to the pipe of an organ its proper quality of tone. Voiced, pp. *voyst:* Adj. having a voice; expressed by the voice. Voice'ful, a. *-fûl,* sounding. Voice'less, a. *-lĕs,* having no voice or vote.—Syn. of 'voiceless': dumb; mute; speechless; silent; noiseless.

VOICE: audible sound produced by the larynx; it may be by any animal possessing that organ; while speech or articulate language is voice modified in the cavity of the mouth. The Larynx (q.v.) is the organ by which the so-called *vocal sounds* (or primary elements of speech) are produced. There are two groups of muscles, which respectively govern (1) *the pitch of the notes,* (2) *the aperture of the larynx.* Those which affect the pitch of the notes are divisible into two antagonistic sub-groups; viz., (*a*) those which depress the front of the thyroid cartilage on the cricoid, and *stretch* the vocal ligaments; (*b*) those which elevate the front of the thyroid cartilage, and *relax* the vocal ligaments; while those which control the aperture of the glottis are divisible into (*c*) those which *open* it, (*d*) those which *close* it. It is only the first of these groups, viz., the muscles which stretch or relax the vocal ligaments, that is concerned in the production of voice. In the ordinary condition of rest, there is a wide opening between the vocal cords, which are in a state of complete relaxation, and the air passes freely

between them. As soon as we wish to utter a sound the two arytenoid cartilages raise themselves in the fold of mucous membrane which covers them, and approach one another. This movement effects the approximation of the vocal cords, and consequently the contraction of the glottis. It is impossible to study with the laryngoscope the mode of formation of the gravest chest-sounds, because the arytenoid cartilages become so raised that they almost come in contact with one another, while they bend under the border of the depressed epiglottis, and thus conceal the interior of the larynx. During the emission of the most acute sounds, the glottis contracts into a mere line, on each side of which the vocal cords may be recognized by their whitish-yellow color; while further outward, and separated from the former by a narrow groove, are the false or superior vocal cords of either side. The arytenoid cartilages are raised and come in



contact in the median line, the epiglottis is drawn outward, and a short stiff tube is then formed above the glottis; all these parts being, as we learn from our sensations during the experiment, in a state of very great tension. Independently, however, of such observations any one may easily prove for himself that the aperture of the glottis is much contracted during the production of sounds, by comparing the time occupied by an ordinary expiration with that required for the passage of the same quantity of air during the maintenance of a vocal sound; moreover, the size of the aperture varies with the note that is being produced; as may be readily seen by any one who compares the time during which he can hold but a low and high note. When the distance between the vocal cords exceeds one-tenth of an inch, no sound can be produced.

How the vocal cords produce sounds is a question

which has long attracted the attention of physiologists and physicists. To answer it, the cords have been compared with various musical instruments. The old comparison to vibrating *strings* has been proved untenable. The analogues between the organ of voice and the *flute-pipe,* in which the sound is produced by the vibration of an elastic column of air contained in a tube, have been investigated, but found to fail. The third class of instruments with which the human organ of voice has been compared are vibratory *reeds* or *tongues,* which may either possess elasticity in themselves, or be made elastic by tension. From the experiments of Weber, it appears that the action of the larynx has more analogy to that of *reed*-instruments than to the instruments previously named. Müller ascertained that membranous tongues made elastic by tension may have three different forms, of which the following, which alone concerns us, is one: 'Two elastic membranes may be extended across the mouth of a short tube, each covering a portion of the opening, and having a chink left open between them.' Here there is clearly an approximation to the human glottis, which may be increased by prolonging the membranes in a direction parallel to that of the current of air, so that not merely their edges but their whole planes shall be thrown into vibration. Prof. Willis has, on this principle, invented an *artificial glottis,* in which the vocal ligaments are imitated by leather, or preferably by sheet India-rubber. It is composed of a wooden pipe of the form of fig. 1, *a,* having a foot, C, like that of an organ-pipe, and an upper opening, long and narrow, as at B, with a point, A, rising at one end of it. A piece of leather or sheet India-rubber doubled round this point, and secured by being bound at D with strong thread, will form an artificial glottis, *b,* while its upper edges, G, H, are capable of vibrating or not by inclining the planes of the edges. Two pieces of cork, E and F, are glued to the corners to make them more manageable. From this machine various notes may be obtained by stretching the edges of the leather in the directions of their length, G, H. The scale of notes yielded by leather is much more limited than that yielded by India-rubber; and other observers have found that the middle coat of the arteries in a moist state (as being more elastic, and almost identical in structure with the vocal ligaments) yields more satisfactory results even than India-rubber. 'It is worthy of remark,' as Dr. Carpenter observes, 'that in all such experiments it is found that the two membranes may be thrown into vibration, when inclined *toward* each other in various degrees, or even when they are in parallel planes, and their edges only approximate; but that the least inclination *from* each other (which is the position the vocal ligaments have during the ordinary state of the glottis) completely prevents any sonorous vibrations from being produced.'—The *pitch* of the notes produced

by membranous tongues may be affected in various ways (as by increasing the strength of the blast, the addition of a pipe, etc.), and is governed mainly by their degree of tension, while the foregoing statements show that the sound of the voice is the result of the vibrations of the vocal ligaments which take place according to the same laws with those of elastic tongues generally. Little is, however, known with certainty regarding the mode and degree in which the tones are modified by the shape of the air-passages generally, the force of the blast of air, and other circumstances.

The *falsetto* is a peculiar modification of voice, differing from the ordinary or *chest voice* not only in the higher pitch of the notes, but also in their quality. The theory of its production is still a question into which we have not space to enter, further than to remark that, according to Prof. Wheatstone, falsetto notes are to be explained by supposing that 'the column of air in the trachea may divide itself into *harmonic lengths*, and may produce a *reciprocation* of the tone given by the vocal ligaments.'

The pressure of the air within the trachea during the production of voice is very considerable. From observations by Cagniard-Latour on a man with a fistulous opening in the trachea, it was found that, when the patient called out at the top of his voice, the pressure was equal to that of a column of water 38 inches in height; when he spoke at his usual pitch, to one of 5 inches; and when he sang in a high note, to one of about 8 inches. The glottis has been well chosen by Dr. Carpenter to illustrate the minute precision with which the degree of muscular contraction can be adapted to the desired effect. The musical pitch of the tones produced by it is, as we have shown, regulated by the degree of tension of the elastic vocal ligaments. Their average length in a state of repose is $\frac{73}{100}$ of an inch; while in the state of greatest tension it is about $\frac{93}{100}$ —the difference being thus *one-fifth* of an inch; while in the female the respective lengths are $\frac{51}{100}$ and $\frac{63}{100}$ respectively—the difference being thus about *one-eighth* of an inch. Now, the natural compass of the voice, in persons who have cultivated the vocal organ, is about two octaves or 24 semitones. Within each semitone an ordinary singer could produce at least ten distinct intervals (the celebrated Madame Mara could sound 100 different intervals between each tone, the compass of her voice being 21 tones), so that 240 is a very moderate estimate of the number of different states of tension of the vocal cords, every one of which can be produced at will; and the *whole* variation in the length of the cord being not more than one-fifth of an inch, even in man, the variation required to pass from one interval to another will not be more than $\frac{1}{1200}$ of an inch (while in such a case as that of Madame Mara the distance would be reduced to $\frac{1}{17000}$ of an inch).

VOICE.

In the production of vocal sounds, the delicate adjustment of the muscles of the larynx, which is requisite to the evolution of determinate tones, is directed by the sense of hearing, being originally learned under the guidance of the sounds actually produced, but 'being subsequently effected voluntarily, in accordance with the mental conception of the tone to be uttered, which conception cannot be formed unless the sense of hearing has previously brought similar tones to the mind. Hence it is that persons who are born *deaf* are also *dumb*. They may have no malformation of the organs of speech, but they are incapable of uttering distinct vocal sounds, or musical tones, because they have not the guiding conception, or recalled sensation, of the nature of these. By long training, however, and by imitative efforts directed by muscular sensations in the larynx itself, some persons thus circumstanced have acquired the power of speech: but the want of a sufficiently definite control over the vocal muscles is always very evident in their use of the organ.'—A fund of interesting matter in connection with this subject is in Dr. Kitto's *Lost Senses*. Although not born deaf, he became *completely* so in early childhood, in consequence of an accident. His voice became similar to that of a person born deaf and dumb and taught to speak. It was observed that the words which he had been accustomed to use before his accident were still pronounced as they had been in childhood, the muscular movements concerned in their production having been still guided by the original auditory conception, while all the words subsequently learned were pronounced according to the spelling.

The various muscular actions concerned in the production of vocal tones are commonly regarded as being under the influence of the will. It is, however, easy to show that this is not the fact. We cannot, by simply *willing* to do so, raise or depress the larynx, or move one cartilage of it toward or from another, or extend or relax the vocal ligaments; though 'we can readily do any or all of these things by an act of the will, exerted for a specific purpose. We conceive of a tone *to be* produced, and we *will* to produce it; a certain combination of the muscular actions of the larynx then takes place, in most exact accordance with one another, and the predetermined tone is the result. This anticipated or conceived sensation is the guide to the muscular movements, when as yet the utterance of the voice has not taken place; but while we are in the act of speaking or singing, the contractile actions are regulated by the present sensations, derived from the sounds as they are produced.' From these remarks, in which Dr. Carpenter has placed a very difficult subject in as clear a light as the subject admits, it follows that the muscular actions concerned in the production and regulation of the voice are due to an *automatic* impulse, similar to what occurs in the movements of the

eyeball, and in many other cases that might be adduced. There cannot be a doubt that the simple utterance of sounds is in itself an instinctive action; though the combination of these sounds into music, or into articulate language, is a matter of acquirement.

Having explained the way in which the larynx produces those *tones* of which the voice fundamentally consists, and the sequence of which becomes *music,* we come to the subject of *speech,* which consists in modification of the laryngeal tones by other organs superior and anterior to the larynx (as the tongue, the cavity of the fauces, the lips, teeth, and palate, with its velum and the uvula acting as a valve between the throat and nostrils), so as to produce those *articulate sounds* of which language is formed. The organ of voice is thus capable of forming a large number of simple sounds, which may be combined into groups, forming words. Vocal sounds are divided into vowels and consonants. When a vowel is pronounced, what happens? This question is thus answered by Max Müller: 'Breath is emitted from the lungs, and some kind of tube is formed by the mouth, through which, as through a clarionet, the breath has to pass before it reaches the outer air. If, while the breath passes through the vocal cords, these elastic *laminæ* are made to vibrate periodically, the number of their vibrations determines the pitch of our voice, but it has nothing to do with its *timbre,* or vowel. What we call vowels are neither more nor less than the qualities, or colors, or *timbres* of our voice, and these are determined by the form of the buccal tube.'—*Lectures on the Science of Language,* 2d series, p. 116. This writer enters fully into the various configurations of the mouth requisite for formation of the different vowels (the vowels are all understood to be pronounced as in Italian): (1) In pronouncing *u* we round the lips, and draw down the tongue, so that the cavity of the mouth assumes the shape of a bottle without a neck. (2) If the lips be opened somewhat wider, and the tongue be somewhat raised, we hear the *o.* (3) If the lips be less rounded, and the tongue somewhat depressed, we hear the *å* of the northern languages (as in *august*). (4) If the lips be wide open, and the tongue in its natural flat position, we hear *a.* (5) If the lips be fairly open, and the back of the tongue raised toward the palate, the larynx being raised at the same time, we hear the sound *e.* (6) If we raise the tongue higher still, and narrow the lips, we hear *i.* The buccal tube here represents a bottle with a very narrow neck, of no more than six centimetres (or about two inches and a quarter) from palate to lips. Diphthongs arise when, instead of pronouncing one vowel directly after another with two efforts of the voice, we produce a sound *during* the change from one position to the other that would be required for each vowel. Though the tube of the mouth thus modified by the tongue and lips is

the chief agent in the production of vowels, Czermak has proved that the *velum palati* is changed in position with each vowel, and that it is lowest for *a*, and rises successively with *e*, *o*, *u*, and *i*, when it reaches its highest point. He found likewise that the cavity of the nose is more or less opened during the pronunciation of certain vowels. Languages might have been formed entirely of vowels, but the existing words consisting solely of vowels, show how unpleasant such languages would have been. Something else was obviously wanted to supply what Max Müller happily terms *the bones of language*—viz., the consonants. These are commonly divided into (1) those which require total stoppage of the breath at the instant previous to their being produced, and which cannot, therefore, be prolonged; (2) those in pronouncing which the interruption is partial, and which, like the vowel sounds, can be prolonged at pleasure. The former are termed *explosive*, and the latter *continuous*, consonants. In pronouncing the *explosive* consonants, the posterior openings of the nostrils are completely closed, so as to prevent the passage of air through the nose; and the current may be checked in the mouth in three ways—(*a*) by the approximation of the lips; (*b*) by the approximation of the point of the tongue to the front of the palate; (*c*) by the approximation of the middle of the tongue to the arch of the palate. The letters *b* and *p* are pronounced by the first of these modes; *d* and *t* by the second; and *g* (hard) and *k*, sounded as *key*, by the third; the difference between *b*, *d*, and *g*, on the one hand, and *p*, *t*, and *k*, depends on the approximating surfaces being larger, and the breath being sent through them more strongly at the moment of opening in the former than in the latter group. The *continuous* consonants may be subdivided into three classes, according to the degree of freedom with which the air is allowed to escape, and the compression which it consequently experiences. In the *first* class, no air passes through the nose, and the parts of the mouth that produce the sound are closely approximated, so that the compression is considerable. This is the case with *v* and *f*, *z* and *s*, *d* and *t*, *th*, *sh*, etc., the movement of the tongue also being concerned in production of several of these sounds. In the *second* class, including *m*, *n*, *l*, *r*, the nostrils are not closed; consequently the air is scarcely at all compressed. In pronouncing *m* and *n*, the breath passes through the nose alone; *m* is a labial, like *b*, but the latter is formed with the nose closed. Hence the passage of *m* to *b* (as in *lamb*) is easy; so is that from *n* to *t*, or from *n* to *g*, as is seen in the frequent combination of *nt* and *ng* in most languages. The sounds of *l* and *r* (letters which Max Müller places in a special group under the name of Trills) are produced, according to Helmholtz, as follows: 'In pronouncing *r*, the stream of air is periodically entirely interrupted by the trembling of the soft palate, or

of the tip of the tongue; and we then get an intermittent noise, the peculiar jarring quality of which is produced by these very intermissions. In pronouncing *l*, the moving soft lateral edges of the tongue produce, not entire interruptions, but oscillations in the force of air.'—The *third* class contains sounds which scarcely deserve to be called consonants, since they are merely *aspirations*, either simple, or modified by an elevation of the tongue, causing a slight obstruction to the passage of air, and an increased resonance in the back of the mouth. The present *h* and the Greek χ are examples of these sounds. The method of pronouncing these sounds is fully discussed in Max Müller's Lectures, 2d series, pp. 127-136.

For further details, see the chapter on 'Voice and Speech' in Carpenter's *Human Physiology;* and Max Müller's *Lectures on the Science of Language* (both largely used in this article): also works of Funke, Helmholtz, Brücke, Czermak, Du Bois Reymond, etc., mentioned by Max Müller in his chapter on 'The Physiological Alphabet.'

VOID, a. *voyd* [OF. *voide, vuide;* F. *vide,* empty, waste—from L. *vidŭus,* empty, bereaved]: empty; not occupied with any visible matter; having no legal or binding force; null; unoccupied; clear, as of offense; destitute, as of understanding; in *OE.,* unsubstantial; unreal: N. an empty space; vacuum; vacancy: V. to quit; to leave empty; to empty; to vacate; to evacuate or be evacuated; to send out; to emit; to pour out; to render of no effect. VOID'ING, imp. VOID'ED, pp.: ADJ. in *her.,* pierced so as to show the field. VOID'ABLE, a. *-ă-bl,* that may be made of no effect; that may be evacuated. VOID'ANCE, n. *-ăns,* act of emptying; ejection; vacancy, as of a benefice. VOID'ER, n. *-ėr,* one who or that which voids; in *OE.,* a basket for broken meat. VOID'NESS, n. *-nĕs,* emptiness; nullity; inefficacy. To MAKE VOID, to render of no effect; to transgress.—SYN. of 'void, a.': destitute; devoid; vacant; hollow; wanting; unfurnished; unsupplied; vain; ineffectual; vacated.

VOIRE DIRE, *vwâr dēr* (L. *veritatem dicere*), in Law: preliminary examination of a witness as to his competency. When a witness is supposed liable to objection for incompetency or otherwise, he is sworn first not in the cause, but on the *voire dire*—that is, to answer questions relating to this incompetency; and if it thus becomes apparent that he is incompetent, he is discharged without further examination.

VOITURE, *vwâ-tür',* VINCENT: poet and letter-writer: 1598-1648, May 26; b. Amiens, France. He made his literary studies in Paris, then entered the service of Gaston, Duke of Orleans, and with him made a tour in Spain. He won the friendship of Cardinal Richelieu by his epistle on the taking of Corbie, esteemed his *chef-d'œuvre.* He was made chamberlain by the king 1638. His poems

mostly are *chansons* and *rondeaux*. More famous than his verses are his letters, in which French prose style was brought to a degree of finish never before reached. The first edition of Voiture's *Œuvres* appeared at Paris 1650; new revised editions with annotations have been issued by Roux, 1856, and by Ubicini, 1856; a separate revised edition of the *Lettres* was published by Uzanne, 1856.

VOLAILLE, n. *vŏ-lā'ĭ* [F.]: in *cook.*, chicken; fowl. SUPRÊME DE VOLAILLE, the white meat of the breast.

VOLANT, a. *vō'lănt* [F. *volant*—from L. *volans* or *volan'tem*, flying; *volārĕ*, to fly: It. *volante*]: passing through the air as if upon wings; flying; nimble; in *her.*, a bird represented as flying bendways toward the dexter side of the shield.

VOLAPÜK, *vō-lâ-pük'* [*vol*, world; *pük*, language]: new universal language; invented 1879, first published 1881, by J. Martin Schleyer, Roman Catholic priest, the 'German polyglot,' b. Ober-Lauda, Baden. The so-called roots are mostly nouns from the Romance or Germanic languages: the words borrowed from other languages are in many instances unchanged—e.g., L. *sol*, sun; Eng. *son*, son: unimportant letters or syllables are often dropped —e.g., Eng. stand, *stan;* Eng. origin, *rig*. Derivatives add suffixes or prefixes—e.g., suffix *ön* (the *ö* pron. like *i* in sir) makes a verb infinitive—thus, *lilön*, to hear, from *lil*, hear. The personal pronouns are: *ob*, I; *ol*, thou; *om*, he; *of*, she; *os*, it; *on*, one; *obs*, we; *ols*, you; *oms*, *ofs*, they. Adding a personal pronoun, instead of the infinitive suffix *ön*, gives the present indicative of an active verb—e.g., *lilob*, I hear; *pükom*, he speaks. Substantives have four cases: the nominative—e.g., *fat lilom*, the father hears; the genitive or possessive, formed by adding *a* to the nominative—e.g., *buk fata*, the father's book; the dative, by adding *e* to the nominative—e.g., *fate*, to the father; the accusative or objective, by adding *i* to the nominative—e.g., *löfob fati*, I love the father. The plural adds *s* to the singular—e.g., *fats*, fathers. There is no article. All nouns are masculine except those which by nature are feminine. A few, abstract, are neuter, ending in *os*—e.g., *jönikos*, the beautiful. Adjectives add *ik* to a root—e.g., *pöf*, poverty; *pöfik*, poor: the comparative adds *um*—e.g., *pöfikum*, poorer, the superlative, *ün*—e.g., *pöfikün*, poorest. The adjective is placed after the noun, except, if there be two, the more important before the noun. *Ka* means than. *So* and *as* are used as in Eng. *No* negatives a verb—e.g., *no pükof*, she speaks not. *Li* is the interrogatory suffix—e.g., *pükof-li?* does she speak? Verbs have six tenses: the present adds the personal pronoun—as, *logob*, I see; the imperfect prefixes *ä*—as, *älogob*, I saw; the perfect prefixes *e*—as, *elogob*, I have seen; the plu-perfect prefixes *i*—as, *ilogob*, I had seen; the first future prefixes *o*—as, *ologob*. I shall see; the second future prefixes *u*—as, *ulogob*, I shall have seen. The passive verb takes *pa*—as, *palöfob*, I am

loved; but only *p* in other tenses. The subjunctive mood takes *la*—as, *logob-la,* if I see. The conditional takes *öv*—as, *älogoböv,* I should see. The imperative adds *öd* —*logoböd,* see. There is a durative mood, inserting *ai*—as, *löfön,* to love; *ailöfön,* to love steadily. The participle add *öl;* and the various tenses of the participle prefix certain vowels. *Ne* negatives—as, *läbik,* happy; *neläbik,* unhappy. *Ge* means back—as *gepükön,* to speak back or answer. For the various classes of pronouns, adjectives, adverbs, the prepositions, conjunctions, etc., with vocabulary and pronunciation, the reader is referred to manuals, like Huebsch's, Sprague's and others. The above gives a general notion of the language. The first congress of Volapükians, of 300 members, was held in Switzerland 1886; a second at Munich 1887; an international one at Paris 1889. There are numerous societies to promote the language in Europe; some in the United States. It has been taught in the College of the City of New York. It is claimed that one may learn the grammar in ten days, and to speak the language in four or five weeks. It remains to be seen whether a newly invented language can be made universal, and whether the grotesqueness of Volapük is likely to be an element of success. Its name and many of its words are ludicrous to an English ear, and especially to an American sense of humor. One would regret that, while Herr Schleyer was about it, he did not invent a musical language, instead of one extremely cacophonous.

VOLAR, a. *vō'lėr* [L. *vola,* the palm of the hand]: in *anat.,* of or belonging to the palm of the hand, as the *volar* artery.

VOLATILE, a. *vŏl'ă-tĭl* or *-tīl* [F. *volatil*—from L. *volatĭlĭs,* flying—from *volārĕ,* to fly: It. *volatile*]: capable of passing easily into the aeriform state, as hartshorn, musk, etc.; lively; full of spirit; airy; changeable of mind; fickle; in *OE.,* able to fly through the air; volant. VOL'ATILENESS, n. *-nĕs,* or VOL'ATIL'ITY, n. *-tĭl'ĭ-tĭ,* the property of being quickly dissipated or of passing off into an aeriform state; liveliness; fickleness; instability. VOL'ATILIZE, v. *-īz,* to cause to exhale or evaporate; to pass off in fumes or vapor. VOL'ATILIZING, imp. VOL'ATILIZED, pp. *-īzd.* VOL'ATILIZABLE, *-ī-zā-bl,* that may be quickly dissipated. VOL'ATILIZA'TION, n. *-tĭl-ĭ-zā'shŭn,* the act or process of causing to pass away in the aeriform state.—SYN. of 'volatility': levity; giddiness; lightness; flightiness; mutuability; airiness.

VOLATILE OILS, or ESSENTIAL OILS: vegetable oils distinguished by the possession of pungent, characteristic odors, and by the fact that they can be vaporized without decomposition, and usually without any considerable residue. The volatile oils differ from the 'fatty oils,' or 'fixed oils' (of which olive oil is an example), from a chemical point of view, in consisting mainly of hydrocarbons, and in containing little or no true fat.

VOLATILE OILS.

The known volatile oils are very numerous, and are obtained from plants, or parts of plants, or from vegetable exudations, mainly by the action of heat or pressure, or by the solvent action of fats. In some cases, as in the extraction of the essential oil in orange peel, a portion of the oil may be obtained by placing the material containing it in horse-hair bags, and subjecting it to pressure. Distillation is also commonly employed, the plants or parts of plants containing the oil being placed in a still with water, the contents of the still being constantly stirred, and heated by means of a steam-jacket. The boiling points of the volatile oils are mostly higher than that of water, but as they possess a considerable vapor tension at the boiling point of water, they distil over at that temperature in sufficient quantity to make the process commercially practicable. In some cases, it is found to be advantageous to raise the boiling point of the water in the still somewhat, by the addition of salt. When the oil that is to be prepared is injured by exposure to the temperature of boiling water, it is customary to extract the oil by macerating the plant with grease. In the preparation of perfumes, for example, it is common to treat the flowers containing the oil with pure lard or paraffin, which is kept fluid by a water-bath. The fat extracts the volatile oil, and when the charged fat is afterward shaken up with alcohol it gives up the oil, in large measure, to the alcohol. The process known as 'enfleurage' is essentially the same as the one just indicated, except that it is not conducted by the aid of heat, the grease being allowed to remain in contact with the flowers for a longer time, at a lower temperature; the oil then being recovered from the fat by means of alcohol, as before.

The following are the more familiar of the essential or volatile oils:

Oil of Bitter Almonds.—Prepared by distilling the pulp that is left after the fixed oil contained in the almonds has been expressed by pressure. It consists mainly of benzaldehyde, C_6H_5CHO, and boils at 179° C.

Oil of Bergamot.—Prepared from the unripe fruit of *Citrus Bergamiæ,* by squeezing the rind by hand and wiping the expressed oil off with a sponge, the sponge being squeezed at intervals into a collecting vessel. It contains a considerable quantity of the hydrocarbon citrene, $C_{10}H_{16}$, together with other compounds whose precise nature has not yet been thoroughly investigated. The oil is extensively used in perfumery.

Oil of Cloves.—Obtained by distilling the flower buds of *Caryophyllus aromaticus.* It consists of a mixture of sesquiterpene and eugenol and is heavier than water.

Oil of Eucalyptus.—Prepared by distilling the leaves of the eucalyptus tree. It is pale yellow in color, and is used in medicine and in perfumery. Its chief constituent is cineol, $C_{10}H_{18}O$.

Oil of Lavender.—Prepared by the distillation of lavender flowers, the best quality being made from *Lavandula vera.* Oil of spike is an inferior variety, prepared from *Lavandula Spica.* Oil of lavender is used in perfumery, and oil of spike is extensively employed in porcelain painting.

Oil of Lemon.—Prepared from scarcely ripe lemon rinds by the sponge method, described above under 'Oil of Bergamot.' An inferior variety is also prepared by distilling the residues remaining from this process. Oil of lemon consists chiefly of limonene, $C_{10}H_{16}$, a hydrocarbon which resembles the citrene of oil of bergamot, but which differs from it in certain particulars. Oil of lemon is used in confectionery and perfumery.

Oil of Origanum, Oil of Thyme, or Marjoram Oil.—Obtained by distillation from certain species of marjoram.

Oil of Peppermint.—Prepared by distilling the herb *Mentha piperita.* It consists chiefly of a solution of menthol in various terpenes, and is used in medicine and as a flavoring, especially in confectionery.

Attar (or Otto) of Roses.—Prepared by the distillation of certain species of roses, and especially from *Rosa Damascena,* which is cultivated in Turkey. It is used extensively in perfumery, and, on account of its high commercial value, is often (and perhaps always) adulterated. The most common adulterant is 'geranium oil,' which is manufactured expressly for adulterating attar of roses, by distilling a species of grass that grows in India.

Oil of Turpentine.—Prepared by distilling the resinous exudations from certain species of pine trees. American oil of turpentine is prepared chiefly from *Pinus australis,* and consists mainly of dextro-pinene, a hydrocarbon having the formula $C_{10}H_{16}$, and boiling at 156° C.

VOLAUVENT, n. *vol-ō-vâng'* [F., a puff of wind]: in *cook.,* a raised pie made with a crust of very light and rich puff-paste; an enlarged and highly ornamented patty.

VOLCANO, n. *vŏl-kā'nō,* plu. VOLCA'NOES, *-nōz* [It. *volcano;* F. *volcan,* a volcano—from *Vulcānus,* in *anc. L. myth.,* the god of fire]: an opening in the earth's crust from which various kinds of matter in a highly heated condition are ejected, such as gases, steam, ashes and cinders, masses of solid rock, and molten rock called lava. The heavier portions of the materials thus ejected fall back within and around the vent, thus in time building up the hilly or mountainous cones by which a volcano is in general distinguished. The depression in the top of these conical formations is called the crater; and the appearance of burning and of vomiting forth flame and smoke, peculiar to a volcano in action, is not caused by external combustion, but is simply the fiery reflection thrown on the ascending volumes of steam and vapor

from the incandescent materials within the vent. VOLCANIC, a. *vŏl-kăn'ĭk*, pertaining to or produced by a volcano. VOLCANICITY, n. *vŏl'kă-nĭs'ĭ-tĭ*, state of being volcanic; also VOL'CANISM, n. *-kăn-ĭzm*. VOLCA'NIAN, a. *-nĭ-ăn*, a poetical form of *volcanic*. VOL'CANITE, n. *-kăn-īt*, Augite (q.v.). VOLCANIC BOMBS, spherical masses of lava frequently thrown out in great numbers and of all sizes by active volcanoes. VOLCANIC CONES, volcanic hills of active or of recent eruption. VOLCANIC FOCI, *fō-sī*, subterraneous centers of igneous action. VOLCANIC MUD, fetid sulphureous mud discharged by volcanoes.—*Volcanoes* are not confined to the dry land. In 1796 a column of vapor was seen to rise from the Pacific Ocean about 30 m. n. of Unalaska. The ejected materials having raised the crater above the level of the water, the fiery crest of the islet illuminated the region 10 m. around. Six years afterward, when a few hunters landed on the new island, they found the soil in some places so hot that they could not walk on it. Repeated eruptions have increased the dimensions of the island, until now it is several thousand feet high and between 2 and 3 m. in circumference. In the same region is the volcanic island Kliutschewsk, which towers out of the sea to the height of 15,000 ft.

The lava, scoriæ, and ashes thrust out of the crater or vent of a volcano form highly inclined and more or less regular beds at the surface of the mountain, extending from the crater-mouth to varying distances down the sides of the volcano. This method of increase gives the uniform conical outline to volcanoes, without the terraces or breaks common in other mountains. The sides are often furrowed longitudinally by straight narrow ravines, which increase in number toward the base. These are produced by the action of running water obtained from rain or from melting snows during an eruption. The rapidity with which floods rush down the steep sides of a volcano gives prodigious force, which the loose scoriæ and ashes, and even the solid lava, cannot resist.

The grayish color of volcanic mountains is produced by the ash and scoriæ, which, though in composition the same as the dark lava, have this lighter color from the minute subdivision of their particles. When a particular series of rocks remain on the surface, and are not covered by the products of more recent eruptions, they weather and decompose, and produce a very fertile soil speedily clothed with vegetation: thus the whole aspect of the formerly bare and uniformly colored mountain is changed.

The vent or crater is a more or less circular opening, communicating with the source whence the ejected materials are obtained. The crater has generally one side much lower than the other—that from which the prevailing wind blows, which carries with it the showers of ashes to the opposite side of the mountain. In many

cases the cone is truncated; a wide hollow of immense extent, and often of great depth, in whose base the crater is situated, occupies the summit. The Spanish name *Caldera* is technically applied to these hollows. Their origin has been a subject of controversy. Von Buch and others maintained that they are craters of elevation—i.e., that the rocks were originally spread out in nearly horizontal deposits, and then upheaved into a dome-shaped mountain, with the hollow caldera in the center of its summit. The more satisfactory explanation is that the original cone, formed by the alternate deposition of the lava and ashes ejected from the crater, has—from the great heat of the molten lava rising in the tube of the volcano, or from gaseous explosions—given way and fallen in. The cones of both Etna and Vesuvius have frequently fallen in and been reproduced. In 1822 the summit of Vesuvius was reduced by 800 ft. and still further in the eruption of 1906. The immense size of some calderas seems, however, opposed to this theory. That of the island of Palma, one of the Canaries, is three to four geographical miles in diameter, and the precipices which surround the cavity are 1,500 to 2,000 ft. in vertical height. They form an unbroken wall, except at the s.w. end, where a deep gorge permits the passage of the torrent which drains the caldera. The precipices are traversed by numerous vertical dikes, and exhibit all the appearances which would be produced by the falling in of the huge summit of this once enormous volcano.

The pressure of the incandescent lava often forces for itself a passage to the surface before it reaches the mouth of the crater, and this is more frequently the case when the volcanic eruption is accompanied with earthquakes. Immense vertical fissures are found radiating from the center of the volcanic action, and reaching the surface of the ground, and even rising to the summit of the mountain; these being filled with the molten rock, which in course of time solidifies and forms often a large portion of the mountain mass, as is shown in the Val del Bové on Etna (q.v.). The lava sometimes pours out of these fissures instead of rising to the crater. During a terrible eruption of Hecla, 1783, a prodigious stream of lava flowed from a lateral crevice; moving slowly down the mountain-side, it reached a distance of 50 m. in 42 days; it then branched into two main streams, one running 40 m., the other 50 m. further toward the sea. Its depth varied from 600 to 1,000 ft., and its greatest width was 15 m. The amount of lava poured out into this stream would almost equal Mont Blanc in bulk.

When the eruptive power of a volcano exhausts itself, it still frequently shows itself by changes which it produces in the level of the country around. In the latter part of the 18th c. a volcano appeared in the center of the great table-land of Mexico, and raised an area of nearly 4 sq.m. 550 ft. higher than it was before, covering it at the same time with conical hills of various heights,

the highest of which is Jorulla, 1,600 ft. But sometimes a subsidence takes place. In 1772 the upper 4,000 ft. of the volcano of the Papandayang, a mountain in Java, 9,000 ft. high, was blown into the air, and, with a vast amount of ashes, overwhelmed 40 villages. A still more powerful explosion occurred in the island Sumbowa, e. of Java, 1822; it was heard a thousand miles, and 12,000 of the islanders were destroyed.

A volcanic eruption is generally preceded by rumbling noises and slight movements in the earth; then fitful puffs of gases and steam are given off. These contain much sulphur; and some volcanoes give out such quantities of carbonic acid and other mephitic gases as to destroy the animals in the neighborhood (see UPAS-TREE). The eruption itself begins, perhaps, with ejection of the finest dust, and that with such force as to project it high into the atmosphere, where, taken up by air-currents, it is often carried to enormous distances. In 1845 the dust from Hecla was after ten hours lying thick on Orkneys and Shetlands. Ashes from Consequina fell, 1835, in Jamaica, 700 m. off; and fine dust covered the ground 30 m. s. of the volcano to a depth of 10 ft. During or after the stupendous eruption, 1883, May 23, of the volcano on the island of Krakatoa, in the Straits of Sunda, between Sumatra and Java, dust and mud were thickly deposited over an enormous area. Nearly the whole island was blown away, and the resulting tidal waves, 50-60 ft. high, swept to death 30,000 people on the shores of neighboring islands, and rolled on, diminishing in height, to the n. Atlantic and around most of the border of the Pacific. The waves of air twice encircled the globe. It has been estimated that 12 cubic miles of material were hurled forth in this great convulsion, most of it falling in the vicinity. Remarkable solar phenomena in Ceylon, s. Africa, Brazil, and elsewhere, were attributed to the presence in the upper atmosphere of volcanic dust from this source; and in the United States, as well as in Europe, gloriously colored skies before sunrise and after sunset, months after the eruption, were regarded as due to the same cause. Sediment left on windows after rain and on snow was chemically tested, and found unmistakably to contain volcanic dust.

Sir William Hamilton says that, 1779, the jets of liquid lava from Vesuvius, mixed with scoriæ and stones, were thrown to a height of 10,000 ft., giving the appearance of a column of fire. The lava, however, generally issues from openings in the side of the mountain. It pours forth in a perfectly liquid state, bright and glowing with the splendor of the sun. At first it flows rapidly; but as its surface becomes cooled and converted into slag, its velocity diminishes. It has to burst the indurated coating before it can continue its progress, and the liberated lava when it flows bears on its surface masses of scoriæ, looking like the slag from an iron furnace.

The theories propounded to account for volcanic action are either chemical or geological. Sir H. Davy suggested that if immense quantities of the metallic bases of the earths and alkalis were present in the interior of the earth, all the phenomena would be produced by their oxidization from contact with air or water. Although the distinguished author of this theory abandoned it, it has since been taken up and advocated by Daubeny and others. Bischof, assuming that the interior of the earth consists of a highly heated and fused mass, considers that the mechanical action of water, converted into steam by the great heat, would produce volcanic action. Both theorists seek support for their views from the fact that the great majority of volcanoes are on or near the sea-coast. Geologists accepting also the doctrine of internal heat, and believing that at a certain depth the rocks of the earth are, partially at least, in a state of fusion, explain volcanoes by considering them as connections established between the interior of the earth and the atmosphere, the elastic force of steam being the propelling power. Darwin, from observations in all parts of the world, believed that volcanoes are found chiefly, and, indeed, almost only, in those areas where subterranean motive-power has lately forced or is now forcing upward the crust of the earth, and are invariably absent in those where the surface has lately subsided or is still subsiding. Opinion now tends to the theory that (without reference to elevation or subsidence) increasing layers of sediment blanket the previous ones beneath, so as to retain the earth's heat; and when by this process the heat is high enough to convert into steam the water that always saturates sediments, the steam makes its way laterally to any fissure or point of least resistance, there locating a volcano, or, in other cases, hot springs, fumaroles, or mud-volcanoes. But even this view leaves the absence of volcanoes, or active ones, along great lengths of coast, an unsolved problem, though it well explains those that are present, and the quiescence of old volcanoes left distant from coasts by continental elevation. A fact of some account is that the subsided sea-areas hinge on the stable continents, and hence lines of fissure are along coasts; also that the earth's shrinkage, together with sea-subsidence, brings a lateral pressure and rupture on the sea-borders. The mineral and chemical constituents of the various materials ejected by volcanoes have been carefully studied, and much valuable information on this and the kindred subject of the causes of volcanic action is in Judd's work, *Volcanoes: What They Are, and What They Teach* (1881). See also Shaler's *Aspects of the Earth* (1889); and Reclus's *The Earth.*

Volcanic action is limited to particular regions of the earth. In these regions the active vents are distributed at intervals, and generally in a linear direction. The Pacific Ocean is bounded by an almost unbroken line of active volcanoes. Beginning in the New South Shetlands,

where there is an active volcano, lat. 62° 55′ s., we pass to Tierra del Fuego, and then on to the Andes, which are throughout their whole course volcanic, though the great centers of present action are confined to Chili, Peru, the neighborhood of Quito, Guatemala, and Mexico. The line is continued northward by the burning mountains of n.w. America, and the Aleutian Islands carry the chain across to Kamtchatka on the Asiatic side. Here turning southward, the line may be traced through the Kurile Islands, Japan, Formosa, the Philippines, Moluccas, New Guinea, and the Solomon and New Hebrides groups, to New Zealand. From Celebes a branch proceeds n.w. through Java and Sumatra to Barren Island in the Bay of Bengal; and even beyond this we find a region in n. India subject to earthquakes, which may lead us, on the one hand, to the volcanic region in Tartary, or, on the other, through Asia Minor to the Greek Archipelago, Sicily, Naples, and on to the Canaries and Cape de Verdes. According to the geological theory, the lines thus traced would represent rising lands, where the crust is less strong, and so less liable to repress the expansive powers below. There are also a number of isolated volcanoes scattered over the surface of the earth; these are supposed to have opened a star-shaped communication with the interior; the most remarkable are Jan Mayen, lat. 70° 49′ n.; and those in Iceland in the n., and Mount Erebus in South Polarland, lat. 77° 32′ s.

Professor T. J. J. See adopts the theory that volcanoes are due to steam accumulating under the earth's crust chiefly by the leakage of the ocean beds. Earthquakes usually result, but an orifice is blown open where the crust is bodily broken as in mountainous areas undergoing elevation. The mountains are all originally due to the expulsion of lava from under the bed of the sea, and hence the land is upraised parallel to the shore, while the undermining of the sea bottom causes it to sink down: the result is breaks in the crust over rising areas which enable the imprisoned steam to break through and start a vent which becomes a volcano. This theory explains satisfactorily the distribution of volcanoes, their relation to earthquakes, and to the elevation of mountains and islands; and is confirmed by the fact that 999 in 1000 parts of all the vapors emitted by volcanoes is steam. Pumice is lava inflated with steam, dried and blown out as porous rock, and when the bubbles break up clouds of volcanic ashes arise. According to Professor See, all mountains are underlaid with pumice, though we see it ejected only from those which become volcanoes. He cites in proof of this view the feeble attraction of mountains, which led early investigators to the idea that they are hollow.

The phenomena of volcanic activity are numerous and varied. A great portion of the material unheaved in an eruption is lava. The kinds of rock composing this are

largely silica and silicates, those containing a relatively small percentage of silica being called basic, and those containing considerable silica, acid. The acid variety of lava is the lighter; sometimes it does not move from the lava vent, and when it does it generally proceeds a short distance only, solidifying in a thick mass. The basic is much more liquid, and covers the slopes of the mountain or forms a lake on the adjacent plains. When lava is imperfectly fused and large quantities of steam are present. the lava becomes, as it approaches nearer the surface, filled with bubbles, which continue to expand, lightening the lava and facilitating its upward movement. At the surface, the lava is torn apart by the steam, the fragments being hurled high in the air. These fragments are known as cinders, or, when finer, ashes. There are also numerous accessory phenomena, such as earthquakes (see EARTHQUAKE); electric and magnetic disturbances; and various acoustic manifestations. The explanations of these phenomena have not yet been satisfactorily reached. One of the most remarkable examples was the disturbance of the magnetic field throughout the world which accompanied the Pelee eruption of 1902, May 8. See Dana, *Characteristics of Volcanoes* (1890); Judd, *Volcanoes* (1881); Russell, *Volcanoes of North America* (1897); and Heilprin, *Mont Pelee and the tragedy of Martinique* (1903).

VOLE, n. *vōl* [said to be connected with *wold*, a plain]: rodent quadruped of the genus *Arvicola*, belonging to a group which some naturalists constitute into a family (*Arvicolidæ*), but which is more generally regarded as a tribe of sub-family of *Muridæ* (q.v.). This group is characterized by thicker and shorter form than that of the true rats and mice; obtuse muzzle; ears of moderate size; round and hairy tail, not so long as the body; molar teeth with flat crowns, which present angular enamelled plates, and without roots, or else very short roots of alternating triangular prisms, instead of fangs. The Lemmings (q.v.) belong to this group. The species are numerous and widely distributed, being found in Europe, Asia, Africa, and North and South America. Some are completely terrestrial in their habits, and are known as 'field-mice'; others are aquatic, and are known as 'water-rats.' In this genus the teeth are only 10 in number, 2 incisors and 3 molars in each jaw. One of the most common European species is the Field Vole (*A. agrestis*), known also as the Meadow Mouse and Short-tailed Field-mouse. The whole length of the head and body is scarcely more than 4 inches, that of the tail rather more than 1¼ inches. In 1813-14 voles threatened the destruction of two forests in Hampshire, Eng., but a remedy was found in digging pits into which they fell, and from which they could not escape. The same method has been successfully employed in some forests of continental Europe. This species of vole is found in most

parts of Europe and in many parts of Asia. It is common in the Himalaya.—Another very common species is the Water-vole (*A. amphibia*), popularly known as the Water-rat, a much larger animal, the head and body being about 8¼ inches long, and the tail 4¾ inches. It burrows in the banks of streams, ditches, and ponds. Its food appears to consist chiefly of aquatic plants, though it refuses no kind of vegetable food, and has been known to store potatoes in its burrow for winter. This species is widely diffused over the continent of Europe. There is a black variety of it, common in parts of England and Scotland, which has been described as a distinct species (*A. atra*).

The great number of American species of field-mice have been distributed under various genera, *Arvicola* retaining only those (among others, with broad incisors, rootless molars with flat crown and serrate margin, body heavy, eyes small, snout blunt, and slow motion due to short legs) which have ears concealed, and some other features. It includes the Pine Mouse (*A. pinetorum*), of New York to Illinois and south, of chestnut color, length 4¾ inches; the Meadow Mouse (*A. Pennsylvanicus*), of the United States generally, grayish brown, darker on the middle of the back, and hoary below, length 5½ inches; and *A. austerus*, of Michigan to Louisiana, grizzly brown, and lead color below, length the same. The Long-eared, the White-footed, the Red, the Rice-field, the Harvest, and other species, separated under other genera, are with the above placed under the one family *Muridæ* (q.v.).

VOLGA, *vŏl'gâ:* chief river of Russia, and the longest in Europe; rising in a marshy plain among the Valdai Hills, in the government of Tver; lat. 57° n., long. 33° 10′ e. From its source, 550 ft. above sea-level, and 633 ft. above the level of the Caspian Sea, into which it falls, the river flows s.e. to Zubzov, then n.e. past Tver and Koliazin to Mologa, where it turns e.s.e. and flows past Jaroslav, Kostroma, Nijni-Novgorod, and Kazan, 50 m. below which, on receiving the Kama, it turns s., passing Simbirsk, Stavropol, and Samara. Thence it flows s.w. to Tzaritzin, where it bends to the s.e., and enters the Caspian Sea by many mouths, after a course of 2,325 m. The Volga waters 9 governments—Tver, Jaroslav, Kostroma, Nijni-Novgorod, Kazan, Simbirsk, Saratov, Samara, and Astrakhan—and 12 other governments are watered by its tributaries; total drainage area 563,300 sq.m. The course of the Volga is generally divided into three parts—the upper part reaching from its source to its confluence with the Szeksna, and, though presenting many hindrances to navigation, yet capable of being traversed from Tver to Rybinsk by craft of 1½ and 2 ft. draught; the middle part, from Rybinsk, in Jaroslav, to Nijni-Novgorod, navigable for larger craft; and the lower Volga, from Nijni-Novgorod to Astrakhan—where

it is about 90 ft. deep—navigable for the largest vessels. Below Astrakhan the Volga becomes very much shallower—in some places only 1½ ft. deep. At Tver the width of the river is 720 ft.; at Mologa, 2,060 ft.; at Nijni-Novgorod, 2,069 ft., but sometimes in the spring 2½ m. wide; at Simbirsk, about a mile wide; between Samara and Sysran, 1 to 3 m. wide. Below Tzaritzin, at the confluence of the Sarpa, the river affords few facilities for navigation, and is remarkable for the number of branches into which it divides before entering the Caspian Sea. The banks of the Volga, which are elevated in the upper and middle reaches, become much lower as the river approaches its embouchure. The chief ferries and commercial towns on the Volga are: Rjev, Zubzov, Tver, Koliazin, Uglitch, Mologa, Rybinsk (great centre of the grain-trade), Jaroslav, Kostroma, Nijni-Novgorod, Kazan, Simbirsk, Samara, Tzaritzin, and Astrakhan. The system of water-communication established by the Volga and its tributaries is of the greatest importance to the commerce of Russia, connecting, as it does, the central districts of the country with the White Sea by the canal of the Prince of Würtemberg; with the Baltic by the three canal systems of Tichvin, Vishni-Volotchok, and Mariinsk; with the Black Sea by the Upa canal, which connects the Oka and the Don; with the Caspian Sea by the great stream of the Volga itself; and with Siberia by the rivers Kama and Tchussovaia. The principal affluents on the right are the Oka (q.v.) and the Sura; on the left, the Tvertza, Mologa, Szeksna, and Kama (q.v.). It has been estimated that the total annual value of the goods carried on the Volga and its tributaries (100 of which have an aggregate navigable length of 14,600 m.) cannot be less than 500 million rubles ($375,000,000), exclusive of the value of 34 million tons of timber and fuel, though official returns make these amounts much less. The Volga and its tributaries are frozen over for several winter months, when traffic is carried on by sledges. The fisheries of the Volga are extensive and valuable: the fish chiefly taken are the sturgeon, roach, pike, bream, tench, gudgeon, lamprey, etc., and the Caspian herring.

VOLHYNIA, *vŏl-hĭn'ĭ-a:* government of w. Russia; bounded s.w. by Galicia, w. by Poland, from which it is separated by the river Bug; 27,731 sq.m. The surface in the north is low, and plains and morasses, covered with forests, abound; in the south, are hills, branches of the Carpathian Mountains, not higher than 1,200 ft. Almost all the rivers flow n., and join the Pripet, affluent of the Dnieper; a few streams, however, flow w., and join the Bug, on which river timber is floated down to Prussia. The soil is sandy or clayey; agriculture flourishes in the south, and grain is exported to Odessa, Galicia, Poland, and partly to Great Russia. Cattle-breeding has always been prosperous in Volhynia until recently, but a fine

breed of sheep are still reared, and this government possesses the finest studs in the empire—those of the Princes Sangousko and Tzartorisky. Of the woods, the principal riches of the n. districts, fir is chief. The forests abound in foxes, hares, and bears, and hunting is a favorite pastime. Many sugar-mills, cloth-factories, and distilleries are in operation, and the manufactures are increasing yearly. Grain, cattle, sheep, wool, cloth, linen, timber, honey, and wax are principal articles of trade.

Volhynia in early times belonged to the ancient Russians, but was conquered by the Lithuanians and Poles 1320, and remained in their hands till its annexation to Russia, 1798. Pop. 3,000,000, of whom nearly four-fifths are Little Russians, and about one-eighth are Jews.

VOLITION, n. *vō-lĭsh'ŭn* [F. *volition*—from L. *volo*, I will: It. *volizione*]: the act of willing; the act of determining choice or forming a purpose; the power of willing or exerting choice (see WILL). VOLI'TIONAL, a. *-ŭn-ăl*, of or pertaining to volition. VOLITIVE, a. *vŏl'ĭ-tĭv*, able to will, as the *volitive* faculty; of or pertaining to the will. —SYN. of 'volition': will; purpose; determination.

VOLKMANN, ALFRED WILHELM: German physiologist: b. Leipsic, Germany, 1801, June 1; d. Halle, Germany, 1877, Apr. 21. He was educated in Leipsic, London, and Paris, was appointed professor of physiology at Dorpat in 1837 and in 1843 accepted the chair of physiology and anatomy at the University of Halle. He made a specialty of the study of the nervous and optic systems. His writings include: *Anatomy of Animals* (1831-3); *The Independence of the Sympathetic System of Nerves* (1842); *Elasticity of Muscles* (1856); *Physiological Researches in the Department of Optics* (1863-4); etc.

VOLKMANN, RICHARD VON ('RICHARD LEANDER'): German surgeon and author, son of Alfred Wilhelm Volkmann: b. Leipsic, Germany, 1830, Aug. 17; d. Jena, Germany, 1889, Nov. 28. He was educated at Halle, Giessen, and Berlin, in 1857-67 was private-docent of surgery at Halle, becoming professor of surgery and chief of the hospital at that university in 1867. He was a surgeon in the army during the wars of 1866 and 1870-1, becoming surgeon-general in the latter war. He was eminent as a lecturer, made many important investigations in surgery and pathology, and was among the pioneers in introducing the surgical methods of Lister into Germany. He wrote: *Traumereien au französischen Kaminen Märchen* (1871; 24th ed., 1894); *Aus der Burscheuzeit* (1876); *Gedichte* (1877); while among his professional writings are: *Beiträge zur Chirurgie* (1875); *Be merkungen über einige vom Krebs zu trennende Geschwülste* (1858); etc.

VOLKMANN, WILHELM FRIDOLIN, Ritter von Volkmar: German philosopher: b. 1821; d. 1877. He was born and educated at Prague, where he later was made

professor of philosophy. He is probably the most conspicuous expounder of the general principles of Herbart's psychology. These are set forth in his *Lehrbuch der Psychologie,* 3d edit. by Cornelius, 1884-5.

VOLLEY, n. *vŏl'lĭ,* VOL'LEYS, n. plu. *-liz* [F. *volee,* a flight; *voler,* to fly—from L. *volārĕ,* to fly]: an outburst of many things at the same time; a discharge of many small arms at once—with cannon such a discharge would be called a *Salvo* (q.v.); an outburst, as of abusive language: Volley, to discharge many things at one time; to throw out. VOL'LEYING, imp. VOL'LEYED, pp. *-lĭd:* ADJ. discharged with a sudden burst.

VOLLON, *vŏ-lŏn,* ANTOINE: French painter: b. Lyons 1833, Apr. 20. He studied at Lyons and Paris, and exhibited for the first time at the Salon in 1864. At the following year's exhibition he received a medal, also at the salons of 1868 and 1869. He is remarkable for his technique and although he paints figures and landscapes is pre-eminent in the delineation of still-life—a long neglected branch of art. Among his pictures of this kind are: *Armor, Curiosities, Sea Fish,* and *The Pumpkin,* this last being in the collection of William Schaus, New York.

VOLNEY, *vŏl'nĭ,* F. *vol-nā',* CONSTANTIN FRANÇOIS CHASSEBŒUF, Comte DE: political theorist, and social and economic reformer: 1757, Feb. 3—1820, Apr. 25; b. at Craon in Anjou, France; son of an advocate. His surname Volney was assumed on his arriving at manhood, according to the curious custom in his country at that time. He studied at the colleges of Ancenis and Angers, and at the University of Paris. His later studies were first in law and then in medicine; but he never practiced. Having inherited a competency from his mother, he set forth 1783 for travel in Egypt and Syria. Returning 1787, he published his famous *Travels in Syria and Egypt,* a trustworthy, lively, and interesting account of the tribes which he had visited. This work gave him great reputation. The sagacity of some of his political conclusions—the result of his residence among these peoples (pub. 1788 in a pamphlet, *Considerations on the War between the Turks and the Russians*)—has been shown by subsequent events. In 1790 he was elected to the états généraux, as a member of his native district; and in the political discussions of the years which followed, showed himself, as in his writings, an advocate of popular liberty, and an acute and brilliant though prejudiced mocker at all systems of religion. His wise and forcible opposition to popular excesses led to his imprisonment 1793, from which he was not liberated till after the downfall of Robespierre, 1794, July.

In 1794, Sep., Volney published his *Ruins: Reflections upon the Revolutions of Empires,* on which, and on his *Travels,* his reputation chiefly rests. The discussions in the *Ruins* cover many radical questions in politics, deal-

ing with them on the French principles of 1789. His able and worthy advocacy of toleration in matters of opinion is needlessly burdened with sarcastic declaration of the human origin and the essential falsity of all religious systems. In his *Physical Principles of Morality*, he treats morality as a merely physical and material science, having no object but the conservation and improvement of society. After a series of brilliant and paradoxical lectures as professor of history for a few months in the Ecole Normale, he went to the United States 1795, intending to make his residence there; but circumstances made his stay there extremely disagreeable to him, and he returned to France in the spring of 1798. He had been elected a member of the Institute and soon after his return he was admitted to the Acad. and thenceforth his life was prosperous and untroubled. Bonaparte, on becoming first consul, sought to make Volney a member of his government as consul or as minister of the interior: these offices he refused, but accepted a seat in the senate. Volney protested against the establishment of the empire, and resigned from the senate; but his resignation was declined. Afterward his occupations were mostly literary. He published *Researches into Ancient History;* and with other books, several linguistic works, in which he set forth a universal alphabet, to simplify the study of the eastern languages. He had accepted from Napoleon the title Count; and at Napoleons' downfall he was among those who were called to the house of peers by Louis XVIII.

VOLOGDA, *vō-lŏg'dâ:* government of Great Russia; bounded e. by the Ural Mountains, n.w. by the government of Archangel; extending 800 m. n.e. from Novgorod to the Ural Mountains; 155,500 sq.m. It is divided into 10 districts. Those adjoining the Ural Mountains are traversed by branches of that chain, 3,000 to 4,000 ft. high—one summit 5,540 ft. But by far the greater part of the government is occupied by marshy plains, covered with impenetrable forests. The soil is not fertile, except in the s.w. districts, which are the most densely peopled, and produce grain sufficient for local consumption and the supply of the distilleries. In the middle districts there are comparatively few inhabitants; and hemp is the only crop largely produced. The wooded morasses of the north are inhabited only by Finnish tribes engaged in hunting: usually the river-banks are the only inhabited places. The principal rivers, 15 of which are navigable, are the North Dwina, with its great upper waters, the Suchona, Jug, and Witchegda; and the Petchora, with its affluents. Lakes are numerous. Salt-works, iron-works, and distilleries are in operation; and salt, iron, skins, tallow-candles, and cheese are exported, and grain and manufactured goods imported. Pop. 1,400,000.

VOLOG'DA: city of Great Russia, in the s.w. angle

of the government of Vologda, of which it is the capital; on both banks of the river Vologda; 467 m. e. of St. Petersburg. It is said to have been founded in the 13th century by settlers from Novgorod, to which principality it belonged till the 15th century, when it was annexed to Moscow. In 1553, when England opened a trade with Russia, through the port of Archangel, Vologda was the great entrepôt for goods deported n. by the North Dwina; and it still exports to St. Petersburg and Archangel products of its own and neighboring governments to a considerable amount. Nigello and filigree work are manufactured. Pop. 30,000.

VOLSCI, *vŏl'sī:* ancient Italian people, closely related to the Umbrians (see UMRBIA). Their territory was bounded w. by that of the Latini, n. by that of the Æqui and Hernici, e. by that of the Samnites, s. by the sea. Along nearly their whole coast lay the Pontine Marshes; inland their territory was somewhat mountainous. The Volsci were a brave and warlike people, who, frequently in alliance with the Æqui, were incessantly at war with the Romans for more than 200 years previous to B.C. 338, about which time it appears that they were finally subdued, their territory incorporated into Latium, and they themselves created Roman citizens (see LATINI.) These wars were very harassing to the Romans, as they were often carried on not so much by the Volsci as a whole, as by different cities, each frequently on its own account. Some of the chief towns, and those prominent in the war were Antium, Velitræ, Satricum, Privernum, Ulubræ, Suessa, Pometia, Anxur, and Tarracina; and later, Forum Appii and Tres Tabernæ. The legend of Coriolanus (q.v.) is connected with the Volscian wars. See ROME, TARQUINIUS SUPERBUS, ANTIUM. After their subjugation their history belongs to that of Rome (q.v.)

VOLSK, or VOLJSK, *vōlsk:* town of European Russia, government of Saratov; on the right bank of the Volga; 90 m. n.e. of Saratov. Fat and skins are prepared and exported to St. Petersburg, and grain is largely exported to Astrakhan and Rybinsk. Gardens and orchards are a chief feature of Volsk and its vicinity; and the fruits are exported principally to Nijni-Novgorod. Pop. 30,000.

VOLT, n. *vōlt* [F. *volte;* It. *volta,* a turn—from L. *volūtus,* pp. of *volvĕrĕ,* to turn]: a sudden movement or leap in fencing to avoid a thrust; a gait of two treads, made by a horse going sideways round a centre.

VOLT. See UNITS, SCIENTIFIC.

VOLTA, *vol'tâ,* ALESSANDRO, Count: renowned Italian physicist: 1745, Feb. 18—1827, Mar. 5; b. Como; of noble family. He received an excellent education. In 1779 he was appointed professor of natural philosophy at Pavia. In 1815 the emperor of Austria made him director of the philosophical faculty at Padua, whence

1819 he retired to his native town—Volta, while a youth, had shown a taste for letters, and had written two poems, one in Italian, the other in Latin; but as he grew older, he applied himself exclusively to the sciences, especially those connected with electricity. At intervals 1777-82 he visited Switzerland, Tuscany, Germany, Holland, France, and England, making the acquaintance of eminent philosophers; and on his return is said to have introduced the culture of the potato into Lombardy. In 1796 he was one of a deputation sent to solicit the forbearance of Napoleon; and was received with distinction by the French general, who afterward invited him to exhibit to the members of the Institute in Paris the action of the 'pile' (see VOLTAIC PILE) which he had invented, enrolled him in the Legion of Honor, and conferred on him the order of the Iron Crown, with the titles Count and Senator of the Kingdom of Italy. He was also elected (1801) a foreign associate of the French Institute, ten years after he had been made a fellow of the Royal Society of London.—Volta's contributions to the science of electricity are of great importance, the chief being his theory, in opposition to the 'animal electricity' doctrine of Galvani, that the electric power resides in the metals; though, in turn, he fell into the error of supposing that the chemical action of the different kinds of metal on one another was only incidental. He also invented an electric battery, consisting of a series of cups arranged in a circle, each cup containing a saline solution, in which were immersed, edgewise, two plates, one of zinc, the other of silver, the zinc plate in one cup being connected with the silver one in the next by means of a wire: this battery was soon superseded by his 'pile.' He invented 1775 the *Electrophorus* (q.v.); in 1782 the electrical *Condenser* (q.v.), employing with it an electrometer (see ELECTRICITY), in which two straws were used instead of the gold-leaf strips now in use; also (1777) the hydrogen-lamp and the electrical pistol. Most of his important discoveries were communicated by him directly to the Royal Society (published in *Philosophical Transactions*, 1782, 3, 1800). A collection of Volta's works, 5 volumes, was published 1816 at Florence. After him Galvanism is often called *Voltaic Electricity;* and the practical unit of electro-motive force is called a *volt.*

VOLTAIC, a. *vŏl-tā'ĭk* [after *Volta,* Italian physi*cist*]: pertaining to Alessandro Volta (q.v.), or to voltaism. VOLTAISM, n. *vŏl'tă-ĭsm,* galvanism or electricity improved and modified by Volta. VOLT, n. *vōlt,* the unit of electro-motive force: see OHM: UNITS, SCIENTIFIC. VOLTAIC BATTERY, an apparatus consisting of a series of pairs of plates of different metals, as zinc and copper, immersed in a fluid, usually diluted sulphuric acid, and connected by wires for the development of Electricity. VOLTAIC COUPLE, any two materials—generally

two dissimilar metals or one metal and one carbon, between which an electrical pressure is set up when immersed in an electrolyte. VOLTAIC ELECTRICITY, the phenomena resulting from the evolution of a current of electricity by chemical action. VOLTA-ELECTRIC, a. of or pertaining to voltaic electricity. VOLTAMETER, n. *vŏl-tăm'ĕ-tĕr* [Gr. *metron*, a measure]: an instrument for measuring the force or intensity of a voltaic current by its effects in decomposing water, or by its heating effects; also called VOLTA-ELECTROMETER. VOLTA-TYPE, n. *vŏl'tă-tīp*, another name for *electrotype*. VOLTA'S or VOLTAIC PILE, a galvanic apparatus consisting of a series of double plates of zinc and copper with a wet cloth between each pair, a copper wire being attached to the zinc plate at the bottom and the copper plate at the top.

VOLTAIRE, *vol-tär'*, FRANÇOIS-MARIE AROUET DE (real name AROUET): one of the most famous of French writers: 1694, Nov. 21—1778, May 30; b. Paris; son of a notary; of Poitevin extraction. [Voltaire's own account, late in life, gives a different date (in the same year) for his birth, and a different place: the statement above is from the official register of his baptism.] He was educated at the College of Louis le Grand in Paris; and was then set to study law by his father. But this pursuit he speedily quitted for the career of a man of letters. By his god-father, the Abbé de Châteauneuf, he was introduced to the celebrated Ninon de l'Enclos, and through her to the highest French society. In these wicked and witty circles, being himself deficient in neither wickedness nor wit, the young man prospered extremely. His father, however, deeply disapproving of the life he led as immoral, and probably expensive, had him sent to Holland with an embassy. Here he became involved in a love affair of the more respectable kind, which ended, not in marriage, as he seems to have proposed, but in his being sent back to Paris, to resume his gay career. About this time (1715) he was introduced to the famous 'court of Sceaux,' the distinguished coterie of the beautiful Duchesse du Maine. Shortly, his brilliant course suffered another interruption, on suspicion (unfounded) of his being author of some satirical verses reflecting on the government of Louis XIV., then just dead, he was sent to the Bastile 1717, May 17, where he remained 11 months. This period he improved by sketching his famous poem afterward published as the *Henriade*, and by finishing his tragedy *Œdipe*, produced 1718, Nov. 18, with great success. The same success did not attend his next ventures: his tragedy *Artemire*, 1720, was hissed off the stage; and his *Mariamne*, 1724, fared little better. Meantime he had again visited Holland, making, on the way, the acquaintance of Jean Baptiste Rousseau, a poet of some importance, then living at Brussels. The two geniuses met as friends, only to part as irreconcilable enemies. Their quarrel is said

to have originated in a characteristic *mot* of Voltaire, who, his critical opinion being asked of an *Ode à la Posterité,* which Rousseau read to him, had the candor to reply thus: 'Mon ami, voilà une lettre qui n'arrivera jamais à son adresse.' In the summer of 1725 occurred a misadventure which for Voltaire had important consequences. At the dinner-table of the Duke de Sulli, he resented with spirit an affront by the Chevalier de Rohan, who, worsted in the war of wit, as most men were likely to find themselves with Voltaire, avenged himself some days later by having his adversary thrashed in public by footmen. Subjected to so gross an outrage, Voltaire retired for a time into private life, assiduously perfected himself in the small-sword exercise, and then challenged the chevalier to a meeting in the *duello.* The chevalier, having immortalized himself sufficiently by his insult to the poet, considered it unnecessary to aspire to the further immortality of being killed by him: he accepted Voltaire's challenge; but on the morning of the day appointed, a *lettre de cachet* consigned Voltaire once more to the Bastile. Thence, after a fortnight, he was released under sentence of exile; and he betook himself to England. A little time previous, the young Arouet had assumed the name of Voltaire, destined to become so famous. As to the origin of this name, considerable perplexity has existed; but Carlyle's conjecture is probable, in vol. II. of his *Frederick,* that it is simply an anagram of Arouet *l. j.* (*le jeune*)—the *u* being taken as v, and the *j* as i.

Arriving in England 1726, Voltaire remained there nearly three years. Of this episode of his life we have only meagre account. It is certain, in a general way, that he had the *entrée* to the best English society: he knew Bolingbroke, Pope, and many others of the intellectually distinguished. To Voltaire his residence in England was fruitful of new knowledge and ideas; in the school of the English deists, Bolingbroke, Collins, Tindal, Wollaston, etc., he found speculations much to his mind; the philosophies of Newton and Locke he studied diligently; and in his subsequent dramas there may be traced a distinct influence from Shakespeare, whom, however, he has expressly vilified, as a barbarous monster of a writer, intolerable to any reader with the least tincture of orthodox French *goût.* Not the less the distinction remains with Voltaire of having been the first Frenchman to recognize in some decisive, though sneering and inadequate way, the essential superiority of the great English poet, to whom also he paid the compliment of copying him. The intellectual debt thus indicated was not the only one which Voltaire owed to England. While resident there, he published in a revised form his epic poem the *Henriade,* a surreptitious edition of which had appeared in France. The work was dedicated in English to Queen Caroline; the subscription for

VOLTAIRE.

it was headed by her and other members of the royal family; the rank and fashion of the country could not but follow the illustrious example set them; and for result, Voltaire could convey into his pocket a comfortable sum (stated as £8,000), which became the basis of his future immense wealth. From the time of his return to Paris 1729, he had always on hand some money-speculation—investments in corn, in bacon, or in whatever a penny could be turned, with now and then a fat army-contract which a friend might have interest to secure for him; and so shrewd in his finance was he, that—though receiving little from his books, which, despite their immense popularity, were never a source of great profit—his income at his death is ascertained to have been about £7,000 per annum, a revenue princely for those times. Of his literary labors, from this time forward unremitting, whose result appears in about 90 volumes, no detailed account can here be attempted. His was truly a universal genius, or rather, a genius covering a universal superficial area; he wrote literally everything—histories, dramas, poems, disquisitions, literary, philosophical, and scientific; novels, mostly with some theoretical purpose, of which his famous *Candide, or the Optimist*, may stand as the type; his literary correspondence was on an unexampled scale (3,000 large, closely printed pages in the most compact editions); and he was seldom without some fierce polemic on hand, in which his adversaries had to writhe for the amusement of the public, under the scourge of his envenomed wit.

In the gay society of Paris he became acquainted with Madame du Châtelet, who was living apart from her husband, the marquis, though still on polite terms with him. She was *assez spirituelle;* a fascinating woman of the world, and in intellectual accomplishment the bluest wonder of the period; especially she was deep in mathematics, and had mastered the mysteries of Newton's *Principia.* Voltaire, as an admirer of Newton, could not but be charmed to meet him thus surprisingly put into petticoats; nor could a woman so intellectual as Madame fail, in her turn, to appreciate the tender attentions of such a genius as M. de Voltaire. Their intimacy became extreme; and finally, in 1734—the accommodating husband of the lady, behaving like a philosopher and man of fashion at that time, and continuing now and then to visit them—they went off to prosecute it undisturbed at Cirey, an old chateau in Champagne, the property of the husband. There Voltaire, with 'the respectable Emily,' studied and wrote for the next 15 years. The arrangement seems to have been on the whole not unhappy of its kind, notwithstanding the frequent quarrels amusingly recounted by Madame de Garfigny; but toward the close it became complicated for Voltaire by the advent of another lover, Monsieur de Saint-Lambert. It is not conjectured that this gentleman knew anything

of Newton, or was such a genius as Voltaire; but on some other ground, unexplained, he found favor with Madame du Châtelet; and after a little unpleasantness Voltaire was able to reconcile himself to the inevitable. This curious triangular love affair—or *square,* if we include the husband—was not, however, of long duration: in 1749 Madame du Châtelet died about four days after childbirth.

To dissipate the sense of loneliness which overpowered him in the loss of his 'divine Emilie,' as Voltaire was wont, in his more lyrical moments, to call her, he betook himself to Paris, whence, in 1751, he proceeded to Berlin, on the earnest and repeated invitation of the young king of Prussia, Frederick, since known as 'the Great.' Between him and Voltaire much correspondence had already passed; and they seem to have entertained for each other a sincere admiration and regard. When they came together, however, their intercourse was found not so enchanting. Into the details of the quarrel which ensued, we need not enter. Voltaire's nature—always that of an impish child with a genius for mischief—soon showed itself in those ways of infernal insolence and of oblique sarcasm of which he was a master, at the expense of his literary comrades; and the king in his attempts to check these processes found himself not only foiled but fooled by Voltaire's trickiness. To this it may be added only that the king was a poet at once profuse and execrable; and that the main function of Voltaire —himself a poet—was to criticise and correct his verses. Voltaire detested the king's verses; the king heartily detested Voltaire's criticism and corrections. In mutual detestation they parted—Voltaire, at his exit from the country, being subjected to indignities which could hardly be forgiven; though a reconciliation was afterward effected, and their literary correspondence was resumed under the old forms of friendliness. Meantime, Voltaire had avenged himself in the amusing but most scandalous chronicle, *Vie Privée du Roi de Prusse,* which was found at his death among his papers, and published, as there is pretty good reason to suppose the wicked wit meant it should be. The period of this Berlin visit was 1751, July 10—1753, Mar. 26.

After some years of somewhat unsettled life, Voltaire, in 1758, established himself along with his niece, Madame Denis, at Ferney, in Switzerland, where, with little exception, the last 20 years of his life were passed. During this period some generous traits of character are recorded of him. He built a church at Ferney, and, as usual, made trouble for himself and others in doing it. More creditable is it that he rescued from extreme want a grandniece of Corneille the great dramatist, had her carefully educated under his own eye at Ferney, and made over to her the proceeds of an annotated edition of her ancestor's works, which he issued for her express

benefit. His exertions in behalf of the Calas family, victims of a shameful persecution, are well known. In 1778 he was induced by his niece to revisit Paris, arriving Feb. 10. By the Parisians the poet, now in his 84th year, was received with a tumult of enthusiasm, the excitement connected with which is thought to have hastened his death, which took place a few weeks afterward. The accounts of his despair and fear at the approach of death are mere legends.

With the possible exception of Rousseau (Jean Jacques), who in his character of *vates* and enthusiast had probably a deeper influence, Voltaire is by far the most memorable of the band of celebrated writers whose crusade against established opinions was preparing the grand crash of the French Revolution. It was mainly in the field of religious polemic that Voltaire's destructive energies were exerted. It is common to stigmatize him as an atheist: but he was plainly a deist, discarding the revelation of God in the Bible, and the manifestation of God in the Christ, yet holding to the elements of a natural religion; and for this last he was criticised by the more 'advanced' minds of the period, Diderot and the like, who considered belief in a God clear evidence of intellectual infirmity. The moral element in him was almost lacking, or at least is scarcely traceable: his whole development was intellectual. He was not lacking in generosity to his dependents; but his general attitude was that of a cynic and a mocker. His intellect, marvellously brilliant and acute, was neither lofty nor profound: he had no constructive, and little receptive power. Carlyle said truly of him, that he never gave utterance to one great thought. He was immensely vain: he was utterly unscrupulous in attack and in self-protection; and equally unscrupulous in money-getting. As a writer, his favorite weapon was ridicule, and there was never, perhaps, a greater master of it. This brilliant ridicule he constantly turns against the most precious tenets of the Christian faith. In a particular form of polished mockery, Voltaire remains without a rival. His prose is the perfection of French style and of literary form; it is admirable in grace, clearness, vivacity, and alive like sparkling wine with the particular quality of *esprit* peculiar to the people and the language. As a dramatist, Voltaire takes rank as a worthy third with his two great predecessors Corneille and Racine. His most famous poems are the *Henriade*, the one epic of the language, and *La Pucelle*, which is, perhaps, more properly to be styled infamous, such is the profanity and indecency with which the writer has wilfully defiled the heroic story of the Maid of Orleans. In the historical works of Voltaire, with the utmost lucidity of method, there appears the superficiality which passed, with him, for philosophy. For narrative charm, his little historiette *Charles Douze* is in its kind a model. Of the numerous editions of the works of Voltaire, the best are those of

Beaumarchais, with introductions and notes by Condorcet (1784-90), Beuchot (1828 et seq.), and Moland (1877-85). The chief biographies are those by Desnoiresterres, *Voltaire et la Société Française au XVIII. Siècle* (2d ed. 1887); Mahrenholtz, *Voltaires Leben und Werke* (1885); Parton, *Life of Voltaire* (1881); Hamley, *Voltaire* (1877); Ballantyne, *Voltaire's Visit to England* (1893); and Espinasse, *Voltaire* (1892). Consult also D. Strauss, *Voltaire: Sechs Vorträge* (1870); John Morley, *Voltaire* (1872); Maugras, *Voltaire et Jean Jacques Rousseau* (1886); Rabaud, *Etudes, Historiques sur l'Avènement de lo Tolérance* (1892); Campardon, *Documents Inédits sur Voltaire* (1893); Deschanel, *Le Théâtre de Voltaire* (1886); Lion, *Les Tragedies et les Théories Dramatiques de Voltaire* (1896); Lounsbury, *Shakespeare and Voltaire* (1902); Calmettes, *Choiseul et Voltaire* (1902).

VOLTERRA, *vōl-tĕr'râ*: town of central Italy, prov. of Pisa; on a table land about 1,600 ft. above sea-level; 51 m. by rail e.s.e. of Leghorn. It is surrounded by cyclopean walls, in better preservation than any other structures of the kind in Italy. The gate called *l'Arco*, and the remains of baths and of an amphitheatre, are interesting vestiges of antiquity; the cathedral, municipal palace, and *Pretorio* are monuments of the middle ages; and the *Mastio*, a prison, is a modern edifice. Volterra contains a college, numerous schools, and a library of 120,000 vols. Wine, oil, corn, and mulberry-trees are grown in the lands belonging to the town, which also possesses considerable mineral wealth.—Pop. (1881) 5,347.

Volterra, anc. *Volaterræ*, was one of the most powerful and important of the Etruscan cities, and came into the possession of Rome B.C. 474: after the fall of the empire it suffered much from the invasion of barbarians.

VOLTIGEUR, n. *vŏl'tĭ-zhĕr'* [F., a vaulter, a tumbler; *voltiger*, to vault]: in *France*, a light-infantry soldier, one of a picked company of irregular riflemen selected for courage, activity, and small stature: they usually have the place of leaders in the attack.

VOLT, INTERNATIONAL: a unit of electric pressure or current-driving electric force, theoretically derived, by electromagnetic principles, from the centimeter-gramme-second system of units. Practically, the international volt is a certain fraction of the electromotive force of a standard type of voltaic cell at a standard temperature.

VOLTI SUBITO, *vōl'tĭ sô'bĭ-tō* [It., turn quickly]: in music, indication at the foot of a page, to signify that the page ought to be turned without delay.

VOLTMETER: an electrical measuring instrument for determining the value of the electromotive force connected to its terminals. A voltage measurer.

VOLTURNO, Italy: a river which rises in the prov-

ince of Campobasso, flows southeast to its junction with the Calore, and then west past Capua into the Mediterranean, 20 miles southeast of Gaeta, after a course of 112 m. Garibaldi won a victory over the army of the king of Naples on its banks in 1860.

VOLTZINE, n. *vōlt'zĭn,* or VOLT'ZITE, n. *-zīt:* an ore of zinc occurring in quartz-veins.

VOLUBLE, a. *vŏl'ū-bl* [L. *volūbĭlis,* that is turned or rolled round—from *volvĕrĕ,* to turn about: It. *volubile*] formed so as to roll with ease, or to be easily set in motion, having quick motion; flowing with ease and smoothness; fluent in speech; in *bot.,* applied to stems, leaf-stalks, and the like, which have the property of twisting around some other body; twining spirally. VOL'UBLY, ad. *-blĭ.* VOL'UBLENESS, n. *-nĕs,* fluency of speech. VOL'UBILITY, n. *-bĭl'ĭ-tĭ,* fluency of speech; aptness to roll.

VOLUME, n. *vŏl'ūm* [F. *volume*—from L. *volūmen,* a roll, a book—from *volvĕrĕ,* to turn round any object: It. *volume:* an anc. volume consisted of a single sheet, as of parchment, with a rod stretched across at each end for the convenience of rolling and unrolling in the reading]: a single fold or turn: a document or writing in the form of a roll; a single book; a roll or wreath, as *volumes* of dense smoke; space occupied; bulk or size; compass of voice; fulness or roundness of voice or sound. VOL'UMED, a. *ūmd,* having the form of a volume; in rolling masses, having bulk; great. VOLUMETRIC, a *vŏl'ū-mĕt'rĭk* [Gr. *metron,* a measure]: relating to measure or volume; performed by measured volumes of solutions of a fixed standard, as *volumetric* analysis. VOL'UMETRICALLY, ad. *-lĭ.* VOLUMINOUS, *a. vŏ-lū'mĭ-nŭs* [mid. L. *voluminōsus*]: consisting of many volumes or books; having written much; copious; diffusive; in *O.E.,* consisting of many complications. VOLU'MINOUSLY, ad. *-lĭ.* VOLU'MINOUSNESS, n. *-nĕs,* the state or quality of being voluminous or bulky. VOLUME DE LUXE, *dĕh lûks* [F. *de,* of; *luxe,* luxury, magnificence—*lit.,* a volume or book of magnificence]: a volume magnificently gotten up in printing, illustrations, and binding.

VOLUMETRIC ANAL'YSIS, *vŏl-ū-mĕt'rĭk,* in Chemistry: analysis consisting in submitting the substance to be estimated to certain characteristic reactions—the chemist employing for such reactions liquids of known strength, and, from the quantity of liquid employed to induce the reaction, determining the weight of the substance to be estimated by means of the laws of equivalance. The idea of this method suggested itself first to Gay-Lussac in considering how most readily to determine the amount of silver in an alloy of silver and copper; but the method itself did not come into general use till a considerable time afterward. The liquid reagents of known strength are called *standard solutions;* and the amount employed may be estimated either by weight or

by volume, but the latter, being the easiest of application, is universally employed—hence the name Volumetric Analysis. In order that a reaction may be applicable in Volumetric Analysis, it must satisfy these two conditions: (1) it must not occupy much time; (2) the termination of the reaction must be easily recognized and unmistakable to the eye. These conditions limit the number of volumetric processes. In addition to the ordinary chemical apparatus, Volumetric Analysis requires graduated glass vessels of different kinds for measurement of the standard solutions. Of these the most essential are: (1) *Pipettes*, glass vessels of the form of figs. 1 and 2, intended for the delivery of the standard solution: fig. 1 shows a vessel provided with a single mark upon the neck, while fig. 2 shows one divided and graduated through its whole length into cubic centimetres (c.c.), according to French scale; (2) *Flasks* graduated for the contents in various sizes from one-tenth of a litre to five litres, and used for preparation of standard solutions; (3) *Burettes*, or graduated tubes for measuring liquids used in an analysis. The best burette for general purposes is known as Mohr's Burette (see fig. 3); and its lower part is attached to an India-rubber tube and spring-clamp or clip (*Quetsch-Hahn*). Its principal advantages over other forms are, that its constant upright position enables the operator at once to read off the number of degrees of standard (or test) solution used for any anlysis, while the quantity of fluid to be delivered can be most accurately regulated by the pressure of the thumb and finger on the clamp; moreover, as it is not held in the hand, no error is likely to arise in the measurement from the heat of the operator's hand. Its greatest drawback is that it cannot be used for those test-solutions which decompose India-rubber.

The *standard solutions*, known also as *test* or *titrated solutions* [from F. *titre*, which signifies the standard of a coin], may be divided into: (1) such as are immediately prepared by weighing a substance of known composition, dissolving it, and diluting it to the required volume; (2) such as are prepared by approximate mixture and subsequent exact analysis. The greatest care is indispensable regarding both the graduation of the measuring instruments, and the strength and purity of the standard solutions, which must be protected from evaporation and other hurtful influences by being kept in bottles of 1 or 2 litres capacity, provided with well-ground stoppers.

Volumetric methods are usually classified as follows, according to the principles on which they are based: (1) *Analysis by saturation*, when the quantity of a base or an acid is measured by the quantity of acid or base required for exact saturation—a point to be determined by test-papers, tincture of litmus, etc. (2) *Analysis by oxidation and reduction*, when the quantity of the substance to be determined is found by the quantity of

chlorine, bromine, iodine, or oxygen to which it is equivalent (regarded as oxidant); or by the quantity of chlorine, bromine, iodine, or oxygen which it requires to pass from a lower to a higher stage of oxidation: the chief oxidizing agents are permanganate of potash and bichromate of potash; while the reducing agents chiefly used are protoxide of iron and hyposulphite of soda. (3) *Analysis by precipitation,* when the determination of a

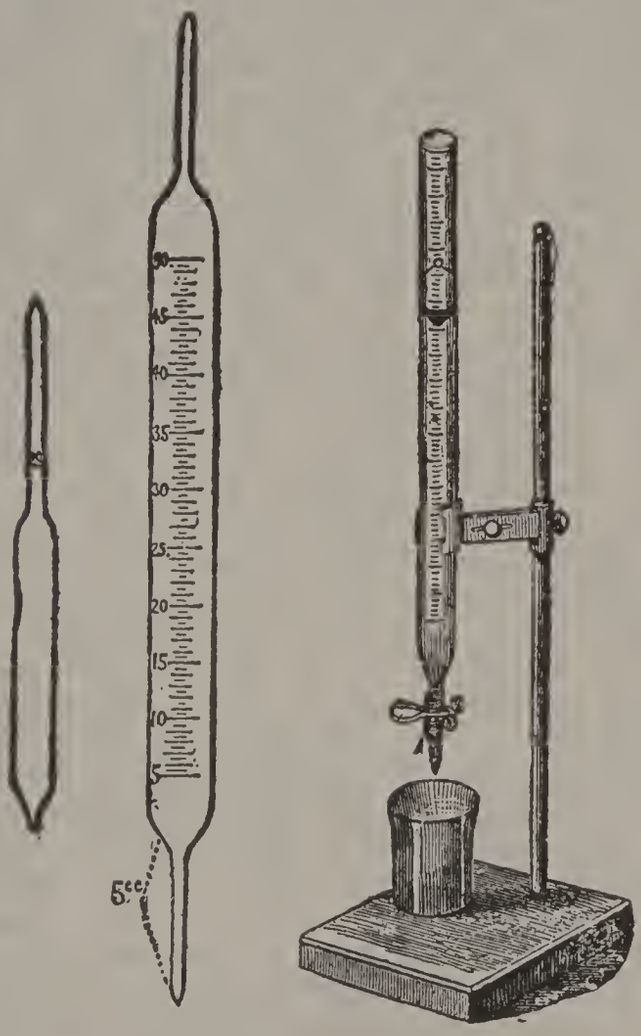


Fig. 1.—A Pipette, containing 10 c. c.
Fig. 2.—A Pipette, containing 50 c. c., divided through its whole length in c. c.; being thus graduated for measuring the delivery of fluids.
Fig. 3.—*a*, the India-rubber; *b*, the slips made of brass wire, by which the India-rubber tube can be closed at will.

substance is effected by precipitating it in some insoluble and definite combination. We have space for an example of only one of these three forms; and, selecting the last for its historic interest in its application to the determination of silver, we give Sutton's account of the process: 'Suppose that it is desirable to know the quantity of pure silver contained in a coin. The coin is first dissolved in nitric acid, by which means a bluish solution containing silver, copper, and probably other metals, is obtained. It is a known fact that chlorine combines with

silver in the presence of other metals to form chloride of silver, which is insoluble in nitric acid. The proportions in which the combination takes place are 35.5 of chlorine to every 108 of silver; consequently, if a standard solution of pure chloride of sodium is prepared by dissolving 58.5 grains of the salt—i.e., 1 eq. sodium (=23) *plus* 1 eq. chlorine (=35.5)or 1 eq. chloride of sodium—in so much distilled water as will exactly make up 1,000 grains by measure, every single grain of this solution will combine with 0.0108 of a grain of pure silver to form chloride of silver, which precipitates to the bottom of the vessel in which the mixture is made. In the process of adding the salt solution to the silver, drop by drop, a point is at last reached when the precipitate ceases to form. Here the process must stop. On looking carefully at the graduated vessel from which the standard solution has been used, the operator sees at once the number of grains that have been necessary to produce the complete decomposition. E.g., suppose the quantity used was 520 grains; all that is necessary to be done is to multiply 0.0108 grains by 520, which shows the amount of pure silver present to be 56.16 grains.'—By volumetric analysis as compared with ordinary analysis, much time, labor, and expense are saved; at the loss, however, often of due accuracy, unless the greatest care be taken that the standard solutions are of due strength, and the instruments accurately graduated. An analysis can thus be completed in 15 minutes that would formerly have occupied a day or more. Independently of its application to pure chemistry, it facilitates to a great extent the chemical analysis of urine, of waters, of manures, soils, etc.—See handbooks of analytical chemistry, in particular Mohr's *Lehrbuch der Chemischen Titriermethode,* and Rieth's *Volumetrische Analysis.*

VOLUMOMETER: an instrument for determining the specific gravity of a solid by measuring the amount of water or other liquid displaced by it. A simple form is a flask having a long narrow neck, and an opening at the side through which the solid may be introduced. The neck is graduated from the bottom upward. The method of using it is as follows: The flask is filled to the zero mark with some fluid in which the solid is not soluble; on turning it on its side the stopper can be removed and the solid introduced; when turned back to an upright posture again the liquid is forced up the stem and the volume reading is the amount of liquid displaced by the solid. From this the specific gravity can be easily calculated.

VOLUNTARISM: a philosophical doctrine which identifies reality with, or interprets it through, some form of will. The import of voluntarism is best understood when it is brought into contrast with the rival doctrine of Intellectualism, which posits the primacy of thought or intellect over will, desire and emotion. Both doctrines

spring from a traditional psychology of faculties which reduces the powers of mind to two, namely, willing and knowing. While they alike admit the existence of these basal powers, the rival theories of Voluntarism and Intellectualism disagree as to which one of them is the primary, irreducible, characteristic of reality, and which secondary, derived and subsidiary. Throughout the histroy of reflective and speculative thought, the two principles involved in Voluntarism and Intellectualism have played a prominent part, not only in metaphysical systems but also in ethics (the problems of freedom and of the nature of the good), in psychology (the constitution and the primary functions of consciousness) and in theology (the essential character of the Deity and his relations to the world and to man). As a distinct type of metaphysical theory, Voluntarism has come into prominence within the nineteenth century. Since Kant's insistence upon the importance of will and belief—in his distinction between the practical and the pure reason—European philosophy has tended to magnify individual initiative, choice, endeavor, volition, and it has therefore been partial to voluntaristic conceptions. The philosophies of Fichte and Schopenhauer represent two forms of Voluntarism, the rational or ethical (Fichte) and the irrational (Schopenhauer). Voluntarism has in recent times received an impetus from the growth of the doctrine of organic evolution which sees in the struggle for existence (and accordingly in endeavor and action) an important factor in the development both of man and of organic nature.—As a psychological doctrine of the primacy of volitional functions of consciousness, Voluntarism is represented, at the present time, by the system of W. Wundt, who maintains that will processes are fundamental and that they are typical of the mental life at large.

VOLUNTARY, a. *vŏl'ŭn-tėr-ĭ* [L. *voluntārĭus,* voluntary—from *voluntas,* free will—from *volo,* I will: It. *volontario:* F. *volontaire*]: acting from choice; having power of choice; proceeding from one's own will; done without compulsion; characterized by volition; of or pertaining to voluntaryism: N. one who does anything of his own free will; a volunteer; a piece of music played at will; one who holds that the ordinances of religion should be supported by free will offerings. VOL'UNTARILY, ad. *-tėr-ĭ-lĭ,* of one's own accord spontaneously; without compulsion. VOL'UNTARINESS, n. *-nĕs,* the state of being voluntary or optional. VOL'UNTARYISM, n. *-tėr-ĭ-ĭzm,* system or practice of supporting the ordinances of religion by voluntary contributions, as opposed to compulsory rates or taxes, or by endowments (see below). VOL'UNTEER', n. *-tēr',* one who enters on any service or undertaking of his own free will; specifically, one who enters into the military or naval service from choice, and not from constraint or compulsion: ADJ. of or pertain-

ing to volunteers: volunteer to offer without solicitation or compulsion, as air or services; to serve as a volunteer. VOL'UNTEER'ING, imp. VOL'UNTEERED', pp. *-tērd'*.—SYN. of 'voluntary, a.': spontaneous; willing; gratuitous; intentional; purposed.

VOL'UNTARY CONVEY'ANCE, in Law: transfer of property, real or personal, without any valuable consideration. Voluntary conveyance comes into question mostly in cases of bankruptcy, when a debtor's estate is insufficient to meet the claims of creditors. The first English statutes regarding voluntary conveyance were 13 Elizabeth c. 5, for protection of creditors, and 27 Elizabeth c. 4, for protection of subsequent purchasers: the law as determined in Elizabeth's time is accepted generally throughout the United States even where it has not been re-enacted in statutes. At one time a voluntary conveyance made when the maker of it was a debtor, even if he possessed many times the amount of the debt, was held fraudulent within the intent of 13 Elizabeth c. 5; but now the proportion of the debt to the whole estate is taken into account, and voluntary conveyance is not regarded as *prima facie* fraudulent unless the property conveyed constitutes a large ratio of the debtor's estate.

VOLUNTARY CONTROVERSY: a controversy begun in Scotland in 1780, and which continued obscurely until 1831, when it began to excite general interest, resulting at length in disruption of the Scottish Presbyterian Church, and to that remarkable action, by which, as a protest against state interference, on Tuesday, May 23, 1843, 396 ministers and professors renounced all claim to the benefices they had held in connection with the Establishment. By this memorable act of self-sacrifice in obedience to principle these ministers and teachers gave up an annual income amounting to at least $500,000.

VOLUNTEERS': in the United States, citizens rendering service as soldiers in bodies outside the regular army, and included in one of two classes: (1) such companies, battalions, regiments, etc., of the Militia (q.v.) of the several states as are actually called into the service of the United States government; (2) troops raised by the several states in obedience to act of congress requiring each state to furnish its quota of men on occasions of national emergency. The term Volunteers does not include the militia of the several states—whether simply enrolled, or also uniformed, armed, disciplined, and organized—except as they are called into actual federal service.—See MILITIA; RESERVE, in Military, etc.—Both the above classes of Volunteers, when in the federal service, are controlled solely by the United States government, under the same rules and articles of war with the regular army, and are practically United States troops. They are paid by the federal gov.—The Volunteers in the United States

service during the civil war numbered 2,690,401, enlisted for various terms and on different conditions—i.e., for 3 years or for shorter service. The number of Volunteers enlisted for 3 months' service (call of 1861, Apr. 15) was 91,816; of 9 months' men (call of 1862, Aug. 4) 87,588; of 100 days' men (1864, Apr. 23—July 18) 83,-612. When the war was ended, the number of Volunteers in the service was 978,000.—In the several states and territories are bodies of 'uniformed militia,' 'national guards,' etc.; these troops correspond to the corps known in England as 'Volunteers.'

VOLUNTEERS OF AMERICA, The: religious organization, outgrowth by secession from the Salvation Army (q.v.). In 1888 Ballington Booth, son of Gen. William Booth, was appointed commander of the American branch of the Salvation Army. In 1896 he and his wife were suddenly recalled to London. To the demand of his return, Commander Booth replied that he would resign his keys, books, and offices, but refused to further accede except on certain conditions to which his father would not agree. A movement of public protest against his recall was at once started by prominent citizens of New York who appreciated the good work that the commander and his wife had done in America, and a telegram, authorized at a public meeting, was sent to London advising his retention in America, to which the chief secretary of the army in London replied that experience had taught the leaders of the army that if a commander remained at one post more than four or five years the work was likely to stagnate. Eventually Commander Booth resigned his commission, and in March Frederick St. Clair de la Tour Tucker, a son-in-law of Gen. Booth, was appointed in his place.

All the circumstances attending the resignation of Ballington Booth and all the reasons for it are not and probably never will be generally known. A strong following in the army signified its desire to help him form a new army or similar organization, and he and his wife immediately set about doing so. The new organization was first named 'God's American Volunteers,' but was subsequently officially called 'The Volunteers of America.' At the end of the first year of its existence, the new organization reported that posts had been established in more than 120 cities, 150 separate societies had been formed, and there were 450 commanding officers.

VOLUPTUOUS, a. *vŏ-lŭp'tū-ŭs* [L. *voluptŭōsus*—from L. *voluptas*, enjoyment, pleasure—from *volup*, agreeably—from *volo*, I wish: F. *voluptueux*]: given to the enjoyment of luxury and pleasure; indulging in sensual gratifications; producing, or expressive of, the sensuous; contributing to sensual pleasure; sensual. Volup'tuously, ad. *-lĭ*. Volup'tuousness, n. *-nĕs*, indulgence in sensual pleasures. Volup'tuary, n. *-ĕr-ĭ*, a man who indulges in,

or is addicted to the pursuit of, sensual pleasures: a sensualist: ADJ. devoted to luxury or pleasure.

VOLUTE, n. *vō-lūt'* [F. *volute*—from mid L. *volūta*, a volute—from L. *volūtus*, pp. of *volvĕrĕ*, to turn round, to roll]: a kind of spiral scroll used in ornaments; the spiral scroll forming the principal ornament in the Ionic, Corinthian, and Composite capitals—derived probably from Assyrian architecture, in which also it is used: a species of spiral shell, a member of the genus *Voluta* and family *Volutidæ* (q.v.), or the fish which inhabits such a shell. VOLU'TED, a. *-lū'tĕd*, having a spiral scroll. VOLU'TION, n. *-shŭn*, a spiral turn or wreath.

VOLUTE WHEEL: a volute shaped wheel that in revolving presents its open mouth to the air, which is thus gathered into the tube and discharged through the hollow axis. It is a common and effective sort of blower. Also, a waterwheel with radial or curved buckets, in which the periphery of the wheel is surrounded by a volute-shaped casing or scroll.

VOLUTIDÆ, *vō-lū'tĭ-dē:* family of gasteropodous mollusks, of the section *Pectinibranchiata:* the Volutidæ all are marine; and have a spiral shell turreted or convolute, aperture notched in front, *columella* obliquely plaited, no operculum. The animal has a very large foot and a recurved siphon. The species are numerous, chiefly in tropical seas. Many have very beautiful shells, prized by shell-collectors. This genus makes its appearance in the Cretaceous strata, and increases in numbers in Tertiary deposits, no less than 50 species being known in the Pleistocene beds.

VOLVA, n. *vŏl'vă* [L. *volva*, a wrapper]: in *bot.*, the involucrum-like base of the stripes of agarics, which was originally the bag enveloping the whole plant.

VOL'VOX: a minute aquatic plant (*Volvox globator*), in the form of a pale green globule floating about in the water. Under the microscope it is seen to be a spherical membranous sac, studded with innumerable green points giving exit to cilia, which enable it to roll over and over in the water. Within the sac are various dense globules, generally green in summer, but often of an orange color in autumn and early winter. They are zoospore-like bodies, each sending a pair of cilia through separate orifices. There is a reddish brown spot and a contractile vacuole.

VOLVULUS, n. *vŏl'vū-lŭs* [L. *volvo*, I roll or twist]: in *medicine*, term denoting a twisting of the intestine, producing obstruction to the passage of its contents. A disorder of a different kind, but with similar symptoms and often similar results, is Intussusception (q.v.). There are three distinct varieties of rotatory movement capable of giving rise to volvulus—(1) A portion of intestine may have become twisted on its own axis, and in that

case even semirotation brings the intestinal walls into contact, so as to close the passage: this is a rare condition, occurring only in the ascending colon. (2) The Mesentery (q.v.), or a part of it, may be twisted into a cone, dragging the intestine with it; the mesentery being the axis, and the intestine being rolled up on it: this form occurs in the small intestine. (3) A single portion or a coil of intestine may afford the axis round which another portion with its mesentery is thrown, so as to compress it, and close the passage. A coil of small intestine, the sigmoid flexure or the cæcum (see DIGESTION, ORGANS OF), may form the axis.—All these varieties occur chiefly in advanced life, and their seat is commonly toward the posterior unyielding wall of the abdominal cavity, the smoothness and yielding nature of the parts anteriorly rendering such an event almost impossible. The *symptoms* of twisting of the intestine, especially of the sigmoid flexure, the most common seat of the affection, are usually distinctly marked from the beginning. Great pain is suddenly experienced in a small circumscribed spot of the abdomen, obstinate constipation usually setting in from that date. If the sigmoid flexure, which lies just above the rectum, is the seat of the twisting, the abdomen soon becomes distended, especially on the left side, the distention being much more marked than when the twist is in the small intestine, as might physiologically have been expected. Vomiting, often constant and copious, is usually present. These cases are so desperate in their nature that it is needless to enlarge on their treatment. Attempts to remove the displacement by injecting water or air into the intestine through a long tube have often been made, but with slight success. Operations for relief of this and other intestinal obstructions, e.g., intussusception, have until recently been very often fatal; but of late the progress of surgery—especially in connection with antiseptics—has greatly reduced the ratio of fatal results. Intestinal obstructions produced either by Volvulus or by other causes have been successfully treated by surgical means; diseased portions of the intestine (e.g., the appendix vermiformis) have been cut out, and the separated parts reunited by sewing (enterorrhaphia).—In the treatment a few rules are universally applicable—viz., wherever symptoms such as above described occur, aperients should be given only by the rectum, while opium should be freely given by the mouth. Leeches and hot fomentations should be applied to the seat of pain; and all solid food should be prohibited, the nourishment being given solely in fluid form.

VOMER, n. *vō′mėr* [L. *vomer*, a plowshare]: in *anat.*, the slender thin bone separating the nostrils from each other. VO′MERINE, a. *-mėr-ĭn*, relating to the vomer.—The *Vomer* in the human subject forms part of the middle partition of the nose, and the lower edge fits into grooves between the apposed surfaces of the palatine

processes of the upper jaw and palate-bones. The Vomer exhibits many modifications in different classes of *Vertebrata.* The presence or absence of teeth on the vomer, i.e., along the middle line of the roof of the mouth in fishes, often forms a very important character.

VOMICA, n. *vŏm'ĭ-kă* [L. *vomica,* a sore or ulcer]: an abscess of the lungs—so called because it discharges diseased matter. VOM'IC, a. *-ĭk,* ulcerous.

VOMICA, VOMIC NUT, n. *vŏm'ĭk.* See NUX VOMICA.

VOMIT, v. *vŏm'ĭt* [L. *vomĭtus,* pp. of *vomĕrĕ,* to vomit: akin to Skr. *vam,* to vomit: It. *vomire:* F. *vomir*]: to eject or throw up the contents of the stomach; to discharge from the stomach through the mouth; to throw up with violence from any hollow or recess: N. the matter ejected from the stomach; an emetic. VOM'ITING, imp.: N. the act of ejecting from the stomach; the act of throwing out substances from a deep hollow, as a volcano; that which is vomited. VOM'ITED, pp. VOM'ITIVE, a. *-ĭ-tĭv* [F. *vomitif*]: causing vomiting; emetic. VOMITO, n. *vō-mē'tō* [Sp.]: the same as black vomit. VOM'ITORY, a. *-tŏr-ĭ,* causing vomiting: N. an emetic; in *anc. times,* the door of a large building by which a great assemblage of people could be let out. BLACK VOMIT, a name given to yellow fever from the vomiting of black matter which attends it at the last.

VOM'ITING: emptying the stomach through the gullet and mouth, effected by abdominal contraction or stomachal action, or both. Vomiting is usually preceded by a feeling of nausea, a flow of saliva in the mouth, and the breaking out of perspiration; the countenance grows pale, a feeling of weakness spreads over the whole body, and the pulse becomes slow. At last the muscles of the abdomen and the diaphragm strongly contract, and the contents of the stomach are ejected with more or less violence. The first matters to be ejected are the food and drink present, then mucus from the stomach and œsophagus, lastly bile from the duodenum. In cases of disease, abnormal substances are sometimes vomited, such as blood, fragments of the intestines, and even excrementitious matters. When the Vomiting is ended, it is followed by languor and drowsiness; or, if the excitement was inconsiderable, a return to the normal state.

The causes of vomiting are various. In the first stages of infancy it is almost normal, and occasions no disturbance of the system. In many animals, too, it is a normal function of life, as when birds of prey reject the hair and feathers of their victims. The infant rids itself of the superabundant milk that it swallows by throwing it up with no trouble. The immediate causes of vomiting may be reduced to the three following categories: (1) The contact of irritating substances with the mucous membrane of the stomach itself. (2) Irritations applied to other parts of the body, operating by *reflex* transmis-

sion—as in the vomiting consequent on the strangulation of a hernia, or the passage of a renal calculus; or in that excited by injection of tartar emetic or emetin into the circulating current, when these substances probably produce their characteristic effect by their operation on the nervous centres. Here might be added the mental disturbance of motion on shipboard, reacting through the sympathetic nerves on the stomach, producing sea-sickness, from which it is said that one can be preserved if he keeps a sense of the true level or horizon, and makes mental allowance, consequently, for all pitching or careening of the ship. (3) Impressions received through the *sensorial centres,* which may be either sensational or emotional, but which do not operate unless they are *felt.* In this mode seems to be excited the vomiting that is induced by tickling the fauces, which first gives rise to the sensation of nausea; as well as the vomiting consequent on disgusting sights, odors, or tastes; also (according to some writers) the vomiting consequent on those peculiar internal sensations preliminary to sea-sickness. The *recollection* of these sensations, conjoined with the emotional state which they originally excited, may itself become an efficient cause of the action, at least in individuals of peculiarly irritable stomachs, or of highly sensitive nervous systems. In vomiting there are two sets of actions—(1) contractions of the abdominal walls, while the diaphragm remains fixed and forms a support to the stomach; (2) the stomach itself performs jerking movements, the pylorus, or inferior orifice, at the same time closing, while the cardiac sphincter relaxes, without which last-named action vomiting is impossible—and either of the two kinds of movement—the abdominal or the stomachal—may eject the contents of the stomach into the gullet.

In the treatment of vomiting, it must be considered as a symptom rather than as a malady. Where the stomach is irritated, relief is afforded, according to circumstances, by drinking cold water, aerated or soda water; or, if necessary, by opium or nux vomica. Cold applications outwardly also do good. In other cases, infusions containing ethereal oils—camomile, coffee, etc.—astringents, or correctives for acidity—magnesia, soda, etc.—are the fitting remedies. Oxalate of cerium in 5-grain doses will often relieve vomiting, especially the morning vomiting of pregnant women. When the irritation is in the brain, the best remedy is a horizontal position, with composure and darkness. If a person in sound health is suddenly seized with vomiting, poisoning may be suspected.

VONDEL, Joost van den: Dutch dramatic poet: b. Cologne 1587, Nov. 17; d. Amsterdam 1679, Feb. 5. His parents, who were Anabaptists, removed to Holland while he was a child, and the poet afterward adopted the Arminian faith, but finally died in the bosom of the Roman Catholic Church. Nature had endowed him with

extraordinary talents, and he derived little aid from education. Devoting himself entirely to the cultivation of Dutch poetry, Vondel first learnèd Latin and French in the 30th year of his age. His works display genius and elevated imagination, and embrace lyric and didactic poems, satires, an epic, and some 30 tragedies, some of which are founded on biblical subjects and bear such titles as *Lucifer, Noah, Jephtha,* etc. These enjoy a high reputation in Holland, and the interspersed choruses may be regarded as the finest lyrical productions of the Dutch muse. The best collective editions of his works are those by Jan van Lennep (1850-69) and Unger (1890 onward). The dramatic poem *Lucifer* (1654) is his greatest work and by some critics is supposed to be the source of the inspiration of Milton's *Paradise Lost,* but this may reasonably be doubted. English translations of Vondel's *Lucifer* (1898); *Samson* (1903); and *Adam* (1903) have been made by C. Van Noppen.

VON'NOH, Robert William: American artist: b. Hartford, Conn., 1858, Sept. 17. He studied at the Massachusetts Normal Art School, Boston, 1875-9; was instructor there in painting and drawing, 1879-81; in 1881-3, and again from 1886 to 1891, studied in Paris, teaching in the interval at the Museum of Fine Arts, Boston. He acquired a manner in which realism and impressionism are emphasized by dramatic effects and boldness of treatment in light, color, etc. Whether in portrait, figure, or landscape painting, his work has individuality and interest, and his success particularly as a portrait-painter has been marked. From 1891 to 1896 he was principal instructor in portrait and figure painting at the Pennsylvania Academy of the Fine Arts. He has exhibited much in this country and in Europe. Among his works are: *Sad News; Miss Mildred Blair; Little Louise;* etc.

VOODOO, n. *vô'dô,* Voudoo, or Hoodoo, *hô'dô* [African word, or possibly a corruption of F. *Vaudois,* name of a people who, being heretics, were accused in mediæval times of witchcraft (see Waldenses)]: a spell, enchantment, witchcraft, or other magical performance—used almost exclusively to denote magical rites practiced by negroes: Voodoo to practice witchcraft, etc., after the manner of the negroes. Voo-dooism, n. the body of superstitious and magical beliefs and practices obtaining under that name almost exclusively among the negro population of the s. United States and W. Indies. The practice of voodooism differs, but not in essential particulars, between one locality and another; its objects are ever the same. In some localities it comprises serpent-worship; in others its chief mode is *imaginatio*—the practice of wreaking vengeance on an enemy by stabbing, hacking, and otherwise maltreating an image of the person against whom the evil intent is directed; or voodoo-

ism may retain traces of cannibalism, as when the rite requires the drinking of a portion of human blood. In short, it is an aboriginal African religious system, retaining some hold on the negro's mind side by side with some amount of Christian belief, each influencing each. Voodooism comprises, in addition to the arts of maleficent magic mentioned above, the art of compounding philters or love-potions. It is practiced by 'voodoo doctors' or 'voodoo priests,' and the people in each more or less definitely circumscribed district usually recognize a voodoo chief (voodoo king or queen).

VOORHEES, Daniel Wolsey: American legislator: b. Liberty, Ohio, 1827, Sep. 26; d. Washington, D. C., 1897, Apr. 10. He was graduated from Indiana Asbury (now De Pauw) University in 1849, admitted to the bar in 1851, and engaged in law practice at Covington, Ind. In 1858-61 he was United States district attorney for Indiana, and he was attorney for the defense of John E. Cook during the latter's trial for participation in John Brown's raid. He was member of Congress in 1861-6 and in 1869-71, and from 1877 to a few months before his death, United States senator from Indiana. He was a member of the finance committee throughout his entire career in the Senate, and an advocate of the free and unlimited coinage of silver until 1893, when he cast his vote to repeal the silver-purchase clause of the Sherman act. He was largely instrumental in securing the erection of the Congressional Library building, and was noted as an orator.

VOORHEES, Philip Falkerson: American naval officer: b. New Brunswick, N. J., 1792; d. Annapolis, Md., 1862, Feb. 26. He was appointed midshipman in the navy in 1809, served in the War of 1812, participated in the capture of the Macedonian and the Epervier, and received a Congressional medal of honor for his services. He attained rank as captain in 1838 and was assigned to command the Congress, in which capacity he captured, in 1844, an Argentine squadron and an allied cruiser which had fired on an American ship. His action was commended in home and foreign diplomatic circles, but he was tried by court-martial. His course was vindicated and in 1847 he was assigned to command the East Indian squadron, a position equal to the rank of rear-admiral, which had not then been established in the United States navy. He was placed on the reserve list in 1855, an action against which he appealed to President Buchanan as unjust. A decision favorable to Voorhees was rendered by Attorney-General Black and he was restored to the leave pay-list.

VOORSANGER, Jacob: American rabbi and educator: b. Amsterdam, Holland, 1852, Nov. 13. Taught at the theological seminary of his native city, he came to the United States about 1870, and was rabbi at Philadelphia

(1873-6), Washington, D. C. (1876-7), Providence, R. I. (1877-8), and Houston, Texas (1878-86). Since 1886 he has been rabbi of Temple Emanu El, San Francisco, Cal. He edited *The Sabbath Visitor* for three years, besides making numerous contributions to leading Jewish weeklies. In 1884 he was elected professor of Semitic languages at the University of California. He has written: *Moses Mendelssohn, Life and Works; Chronicles of Emanu El.* He founded in 1895 a weekly, *Emanu El,* which he continues to edit.

VOPADEVA, *vo-pa-dā'va:* celebrated grammarian of India; whose date, given by some as the 12th c., is, according to Burnouf's investigation, the second half of the 13th c. He wrote a grammar entitled *Mugdhabodha,* held in high repute, especially in Bengal: it was commented on by *Durgadâsa* (text and commentary edition at Calcutta 1861). It differs from the great work of Pân'ini in arrangement and terminology, and is of far less value, though very serviceable in giving many later Sanskrit formations. Vopadeva composed other works; and a general though doubtful tradition makes him author of the *Bhâgavata-Purân'a.*

VORACIOUS, a. *vŏ-rā'shŭs* [L. *vorax* or *vorācem,* swallowing greedily—from *voro,* I swallow up: It. and F. *vorace*]: eating or swallowing greedily; ravenous; very hungry; rapacious; ready to swallow up. VORA'CIOUSLY, ad. *-lĭ.* VORA'CIOUSNESS, n. *-nĕs,* or VORAC'ITY, n. *-răs'ĭ-tĭ,* greediness of appetite.

VORANT, *vō'rănt,* in Heraldry: devouring or swallowing: as, sable, a dolphin naiant, *vorant,* a fish proper.

VORARLBERG, *fōr-ârl'bĕrg* [the land in front of Ariberg, a mountain in the Algau Alpine system]: district administratively united with the Austrian crown-land Tyrol, but retaining part of its ancient autonomic institutions; bounded e. by Tyrol, s. by the Swiss canton Graubünden, w. by the principality of Liechtenstein and the canton of St. Gall, n. by Bavaria; 1,005 sq.m. Where the land approaches the Lake of Constance and the Rhine and in the valley of the Ill, the country is a fertile plain; the rest is alpine. About one-third of the surface is forest (Bregenzer Wald). Cattle and timber are the chief products. The manufacture of cotton fabrics is a considerable industry in Vorarlberg, employing 180,000 spindles and 4,000 power-looms; a home industry for the women is the manufacture of embroidery for insertions, edgings, etc. Bregenz, the capital, is a center for manufacture of wooden-wares. Vorarlberg has, as a reminiscence of its ancient condition as an independent state, its own assembly or Laudtag, consisting of 19 members, one representing the chamber of commerce, 4 the towns, and 14 the parishes. Pop. (1890) 116,073.

VORONEZH, or VORONEJE, *vo-rō-nĕzh',* or VORONETZ, *vō-rō-nĕts':* government in the south of Great Russia,

bounded s. by Little Russia and South Russia; 25,448 sq.m. It is traversed by the Don from n. to s.e., which with its two navigable tributaries, the Voroneje and Khoper, waters Voronezh for more than 400 m. The soil, mostly black mold, is generally fertile; producing, for local supply and for export great crops of grain—wheat, rye, barley, oats, and millet. Cattle and horses of good breed are reared; the best studs belong to the crown. The principal manufactured articles are brandy, beer, cloth, beet-root, sugar, skins, wax-candles, soap, tobacco, and potash: grain, tallow, hemp-seed, cattle, and horses are exported to Moscow, St. Petersburg, etc. Pop., largely Little Russian in the s.w. and Great Russian elsewhere, 2,600,000.

VORONEZH, or VORONEJE', or VORONETZ': town of Great Russia, capital of the government of Voronezh; on the right bank of the Voronezh; 150 m. s.w. of Tambov, 365 m. by rail s. of Moscow. It was founded 1586 as a bulwark against Tartar invasion. Peter the Great, who had visited the town, built a fortress and a dockyard here 1694. Besides two cathedrals, the town has many important civil, ecclesiastical, and educational institutions. The commerce is extensive—the chief articles of trade being grain, hemp-seed, and tallow. Pop. about 85,000.

VORTEX, n. *vawr'tĕks*, VOR'TICES, n. plu. *-tĭ-sēz* [L. *vortex* or *vortĭcem*, a whirlpool—from *verto*, I turn]: a whirling or circular motion of water, air, or such material as sand, forming a kind of cavity in the center of the circle; an eddy or whirlpool; in *Cartesian phil.*, a collection of particles of a subtile matter, pervading space and having a rapid rotatory motion round an axis (see below). VOR'TICAL, a. *-kăl*, whirling; rotatory; also VOR'TICOSE, a. *-kōs*. VOR'TICALLY, ad. *-lĭ*. VORTEX-WHEEL, a turbine. VORTIGINOUS, a. *vawr-tĭj'ĭ-nŭs*, having the character of a vortex or whirlpool; whirling; rotatory.—The theory of *Vortices* or eddies has only in comparatively recent times been properly brought under the domain of mathematical analysis. Even now the problem has been only partially solved by the labors chiefly of Stokes (q.v.) and Helmholtz (q.v.), as their investigations apply only to *perfect* fluids—i.e., fluids which oppose no frictional resistance to change of shape. In ordinary motions of perfect fluids, e.g., in currents and waves, the instantaneous change of shape of a small spherical portion makes it an ellipsoid by simple extensions and compressions *without* rotation. The essential characteristic of vortex-motion is, that it involves rotation of some parts of the fluid. Helmholtz has shown that this rotational or vortex motion remains with the parts of the fluid which first have it, and cannot be transferred. We can conceive no process by which vortex-motion could be given to, or taken from, a perfect fluid; for, to our reason, fluid friction (which does not exist in

a perfect fluid) would seem indispensable. The smoke-rings are well known which are produced when a mortar is fired; or when, on a smaller scale, a bubble of phosphuretted hydrogen takes fire in air, or a smoker skilfully emits a puff of tobacco-smoke. A simple mode of producing them, on even a large scale, is to bore a hole in one side of a box, remove the opposite side, and substitute a cloth or sheet of India-rubber for it: a slight blow on this membrane ejects a vortex-ring from the hole. To make this vortex visible, we may burn phosphorus or moistened gunpowder in the box; or, better, sprinkle its interior with ammonia, and introduce a vessel containing common salt and sulphuric acid: the sal-ammoniac cloud which fills the box is admirably adapted to display the rings. The general character of these rings or vortex-tubes is shown in the diagram (fig. 1), which indicates that, besides a progressive motion as a whole, the ring revolves about its own central or medial line. Supposing two such rings to follow one another, with their planes parallel, and their centers moving in the same line, Helmholtz shows that (at least in a perfect fluid) the foremost will relax its speed, and spread out into a larger ring, while its follower will contract, and quicken its pace, till it passes *through* the other, which in turn becomes the pursuer, and so on. This very curious result may be realized in a tea-cup, by drawing the half-immersed bowl of a teaspoon along the surface of the tea for a short way, and withdrawing it. Two little whirlpools or vortices are then seen moving side by side. They are sections of the half vortex-ring which has been formed in the liquid by the spoon. A second half-ring may be at once sent after them by another stroke of the spoon, and the phenomenon above described will be obtained. When, on the contrary, two such vortex-rings *meet,* their centers moving in one line, they both spread out, and relax their speed indefinitely. This is obtained in a liquid by letting the half vortex-ring impinge directly on the side of the vessel, when it spreads out and relaxes its speed; just as if there were no boundary of the fluid, but a second vortex-ring occupying the place of the image of the first which would be formed by a plane mirror substituted for the side of the vessel. When one vortex-ring impinges obliquely on another, it rebounds from it, and both are thrown into vibration, their form of equilibrium being circular. They act in this respect like solid India-rubber rings. By forming them from an elliptic aperture, they are produced in a state of vibration. A square aperture gives them in a different state of vibration.

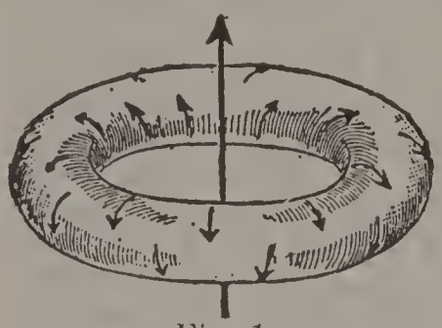


Fig. 1.

The impossibility of either producing or destroying vortex-rings in a perfect fluid—except by creative power—led Sir W. Thomson (q.v.) to regard the ultimate parts of matter as vortices of various kinds in a perfect fluid: two such indestructible *vortex-atoms* are here sketched (fig. 2).

The word vortex has come into use in the Cartesian philosophy in connection with Descartes's celebrated but long ago discarded theory of the universe, given in his *Principia Philosophiæ* (see DESCARTES, RENÉ). In this the rotation of the planets about the sun, the satellites

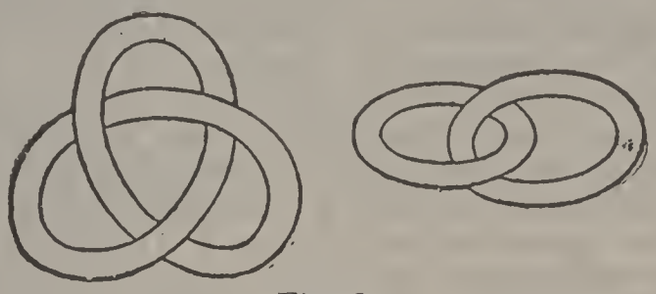


Fig. 2.

about the planets, etc., was attempted to be explained by the hypothesis of vortices forever whirling about the central body. Descartes was a great mathematician; but in natural philosophy—like some recent eminent scientific men—he was betrayed into metaphysics, therein losing his scientific foothold.

VORTICELLIDÆ, *vawr-tĭ-sĕl'ĭ-dē:* family of *Infusoria*, remarkable for beauty, and containing a great number of species, to which, from their form, the name of *Bell* or *Bell-flower Animalcules* is often given. The genus *Vorticella* consists of minute cup-shaped or bell-shaped creatures, each placed at the top of a long flexible stalk, the other end of which is attached to some object, e.g., the stem or leaf of an aquatic plant. Around the edge of the bell or cup is a fringe of rather long cilia, the motion of which brings food to the mouth. The stem is flexible, and is sometimes stretched out to its full length, sometimes contracted in a spiral form. The contraction takes place instantaneously on any alarm, the cilia at the same time vanishing; and it is interesting to watch a group (easily done with a Coddington lens) when they adhere to the inside of the glass of an aquarium. The stem is often beautifully branched, the *Vorticella* becoming a compound animal, like many zoophytes, and the whole contracts or is extended at once. The stem, slender as it is, is a tube, through whose whole length runs a minute muscular thread. A cup or bell of a *Vorticella* sometimes develops a new fringe of cilia at its point of junction with the stem, becomes detached from the stem, and begins to move freely through the water, till it finds a new place on which to fix itself, reproduction thus taking place by gemmation. Reproduction takes place also by encapsulation (see INFUSORIA).—To the

family Vorticellidæ belongs the genus *Stentor*, having a trumpet-shaped body, thence receiving the popular name Trumpet Animalcules. They swim freely through the water, at the same time rotating on an axis, and attach themselves to objects by a sucker at the lower or narrow end. They have a fringe of cilia round the mouth, and the body of some species is covered with cilia. They are very voracious. They may often be found adhering to a twig or the stem of an aquatic plant, looking like very minute whitish moss.

VORTIGERN: a semi-mythical British king of the 5th c., who, according to Gildas, Bede, Ethelwerd, and the 'Old English Chronicle,' invited Hengist (q.v.) and Horsa to assist him against his enemies, the Picts and Scots. Whether invited by Vortigern or not, the newcomers are said to have turned against him and wrested from him the Kentish territory. There is something like unanimity in the chroniclers regarding Vortigern's character. They make him tyrannical and licentious. It is to be presumed that he came to a violent end in conflict with the invaders who had established themselves in his dominions.

VOS, Maarten de: Flemish painter: b. Antwerp, 1532; d. there, 1603. He studied in Antwerp under his father, Pieter de Vos, and De Vriendt, and at Venice under Tintoretto, established a school of painting in his native city in 1538 and became one of the most popular artists of his day, hundreds of engravings of his paintings and drawings being made. Among his works are *The Triumph of Christ; Cæsar's Penny; The Marriage at Cana*, in the cathedral at Antwerp; *Saint Luke Painting the Portrait of the Virgin.* He is sometimes styled 'the Elder,' in distinction from his son Maarten (b. 1576; d. 1613), also an artist.

VOSGES, *vōzh:* department in n.e. France, formed 1790 out of the s. part of the old province of Lorraine; bounded n. by the departments of Meuse and Meurthe, e. by Alsace-Lorraine; 2,260 sq.m. The portion belonging formerly to Alsace was ceded to Germany 1871. The surface is mountainous, the territory being traversed by the Vosges Mountains along its e. border, and by the Faucilles Mountains, which cross the department from e. to w. The chief rivers are the Moselle and its tributaries, the Meurthe, Madon, and Mortagne, all flowing n. or n.w. The mountains in the e. are covered with vast forests of beech and fir; and at the base of the mountains are tracts of pasture or rolling infertile plains. The w. part, called the *Plaine*, is very fertile in cereals, vegetables, and fruits. Among the hills the climate is cold; on the Plaine, humid. Average annual product of wine nearly 4,000,000 gallons. Mineral riches abound—there being iron, lead, copper, cobalt, and antimony mines. Of the kind of cheese called *Géromé*, 23,600 cwts. are made annually. The department is divided into five arrondisse-

ments—Epinal, Mirecourt, Neufchâteau, Remiremont, Saint-Die. The capital is Epinal. Pop. of dept. (1901) 421,104.

VOSGES MOUNTAINS (L. *Vogesus*, Ger. *Vogesen* or *Wasgau*): range of mountains in n.e. France and w. Germany, extending from s. to n., on the left bank of the Rhine, from the borders of the departments Haute-Saône and Doubs n. to Mainz, and separating Alsace from the French departments of Vosges and Meurthe and the German Lorraine. The range runs parallel with the Schwarzwald or Black Forest in Baden and Würtemberg on the right bank of the Rhine, and forms the w. border of this part of the Rhine basin. The summits are rounded and regular in outline, and are called *ballons*. The chief are the Ballon de Guebwiller, 4,690 ft.; le Hobeneck, 4,482 ft.; and the Ballon d'Alsace, 4,101 ft. They are covered with forests, and abound in rock-salt, silver, copper, lead, and coal.

VOSS, *foss*, JOHANN HEINRICH: one of the foremost classical scholars of Germany: 1751, Feb. 20—1826, Mar. 29; b. Sommersdorf, in Mecklenburg; of poor parents. In 1772 he went to the University of Göttingen, and there joined the 'Hainbund,' an association of young poets, at the head of whom stood Bürger and Boje. Voss first intended to study theology, but soon turned to Greek and Roman antiquities, under Heyne's auspices. In 1778 he went to Otterndorf, in Hadeln, where he prepared his translation of the *Odyssey*, which appeared 1781, and received universal applause. The next year he became rector of Eutin, whence, 1789, he issued his German translation of Virgil's *Georgics*. His contests with Heyne (q.v.) gave rise chiefly to his *Mythological Letters* (1794). Among his purely German poetical works, *Luise*, an idyl (1783, revised 1795), has foremost place. In 1799 he issued the whole of Virgil in German. In 1802 he went to Jena, where he wrote the famous review of Heyne's *Iliad*. In 1805 he was called to Heidelberg, where he wrote annotated German translations of Horace, Hesiod, Theocritus, Bion, Moschus, Tibullus, and Lygdamus. In 1821 he published a translation of Aristophanes and a new edition of Horace and Virgil. He with his two sons translated Shakespeare's works. In opposition to Creuzer's *Symbolik*, he wrote an *Antisymbolik* (1824), in which he lifted up his voice against exaggerated praises of heathen mysticism. Voss was a strong upholder of the right of free judgment in religion, and one of his last papers was a vigorous denunciation of his former friend Stolberg, who had turned Roman Catholic. He died at Heidelberg.—His two sons, HEINRICH VOSS (1779-1822) and ABRAHAM VOSS (d. 1847), also were known as translators. See biographies by Paulus (1829) and by Herbst (2 vols., 1872-76).

VOSSIUS, *vŏsh'ĭ-ŭs*, GERARDUS JOHANNES (i.e., Gerard, son of John), LL.D.: classical scholar and theologian:

1577-1649, Mar. 17; b. of Dutch parents near Heidelberg, where his father (John Vos) was a protestant minister. In 1578 the family returned to Holland, and settled at Dordrecht, where Vossius went to school. He distinguished himself at the University of Leyden; and at the age of 22 returned to Dordrecht, to become principal of the high school. He was a most assiduous and indefatigable student. While principal of the theological college of Leyden 1614-19, he published a work on Pelagianism (*Historia Pelagiana*), in which he spoke of the Arminians in an apologetic tone, and thereby brought upon himself the wrath of the Calvinistic Dutch clergy; which caused him to be deprived of his office in the theological college. In 1622 he was appointed professor of rhetoric and chronology, and afterward of Greek, in the University of Leyden. In 1626 he was invited to England; but accepted only a prebend (from Abp. Laud) in Canterbury Cathedral, of the value of £100 per annum, without being required to live out of Holland. He was also made LL.D. of Oxford. In his book *De Historicis Latinis* (1627) he retracted at least some of his former expressions of opinion; and 1632 he was appointed professor of history in the new university at Amsterdam, where he seems to have completed the great works on which his fame rests. Among the most important not mentioned above were: *Aristarchus, sive de Arte Grammatica, Libri VII.; De Historicis Græcis, Libri IV.; Commentariorum Rhetoricorum, sive Oratoriarum Institutionum, Libri VI.; De Veterum Poetarum Temporibus, Libri II.*—In 1649, as he was climbing the ladder of his library, it broke; he fell under the shelves and books, and died of his injuries.

Vossius's children were remarkable for beauty, accomplishments, and learning. Grotius said of him, in epigrammatic Latin, that it was doubtful whether by his books or his children he had contributed most to adorn the age. Five of his sons, Denis, Francis, Gerard, Mathew, and Isaac (q.v.), are known as authors.

VOS'SIUS, ISAAC, LL.D.: classical scholar: 1618-1689, Feb.; b. Leyden; the only son of Gerard Vossius, who survived him. He was carefully educated by his father; and at the age of 21 he published an edition of the *Periplus* of Scylax, the Greek geographer, with Latin translation and notes. He afterward traveled in Italy, collecting valuable MSS. In 1648 he took up his abode at the court of Queen Christina of Sweden, whom he taught in Greek; but 1658, in consequence of a quarrel with Salmasius, he returned to Holland. In 1670 he came to England, procuring favor through his father's merits; and was made LL.D. of Oxford, and, though he had become an open scoffer at religion, he was appointed by Charles II. a canon of Windsor 1673, and had apartments assigned him in the castle, where he died. His works are numerous; and though marred by his levity and lack of

judgment, some of them have been of value in ancient history, etc.

VOTARY, n. *vō'tėr-ĭ,* VO'TARIES, n. plu. [L. *votum,* a vow (see VOTE)]: one devoted, as by a vow, to some particular service, study, or state of life; one addicted to any particular pursuit. VO'TARESS, n. *-ĕs,* a female votary; also in *OE.,* VO'TRESS, n. *-trĕs.* VO'TARIST, n. *-ĭst,* OE. for VOTARY.

VOTE, n. *vōt* [F. *vote,* a vote—from L. *votum,* a thing solemnly promised—from *vovērĕ,* to vow: It. *voto*]: a formal expression of choice or preference in regard to any measure proposed; an expressed preference for a particular person as best fitted to fill a certain situation or office; expression of will or choice by a majority; that for which the expression of will is required, as a *vote* of confidence; that by which preference or choice is expressed; suffrage (see SUFFRAGE; BALLOT): V. to express will or preference, as in electing an individual to an office; to express mind or will in regard to the passing of laws or regulations; to choose or establish by vote or suffrage; to grant, approve, set aside, declare, etc., by vote, as to *vote* supplies, to *vote* the thing a success. VO'TING, imp. VO'TED, pp. VO'TER, n. *-tėr,* one who votes or who has a right to vote. VO'TIVE, a. *-tĭv* [L. *votīvus,* promised by a vow]: given by a vow; promised by a vow—applied to actions, offerings, observances, or the like, intended as the fulfilment of a vow, or as commemoration of the accomplishment of the prayer which accompanied the vow (see VOW). Of such votive engagements numerous examples are found in the Old Testament (Lev. xxii. 18; Deut. xii. 6), as well as in the ancient religions of the Gentile world; and the ecclesiastical historian Theodoret (*De Cur. Græc. Affect.,* I. 8) alludes to the practice in his day of hanging up, in the churches dedicated to the saints, little models of hands, feet, eyes, etc., in votive commemoration of the cure of lameness, blindness, and other maladies, believed to have been obtained through their intercession. The same practice still prevails in Roman Catholic countries, especially in Italy and s. Germany; also in heathen countries generally. The offering frequently takes the form of a tablet, with an inscription detailing the event on which it is founded. Sometimes the offering is simply marked with the words *ex voto,* 'in fulfilment of vow'; sometimes it is accompanied by a model in wax, in wood-carving, or even in precious metals, similar to those alluded to by Theodoret; and occasionally by a model of some object, which is meant to recall the memory of the favor received, as of a ship in case of escape from shipwreck, etc. Many of the great churches, hospitals, monasteries, and other religious monuments of the middle ages and of later times, were built *ex voto;* and the treasuries of most of the rich cathedrals and other churches in continental Europe contain objects of great value, the result of votive engage-

ments on the part of the donors.—The epithet *votive* is also applied in the Roman Catholic Church to the mass or other service, when it is celebrated—as is permitted on certain days and in certain seasons—not according to the rite prescribed for the day, but according to a rite selected by the celebrant himself from a number of such 'votive masses' and 'votive offices,' e.g., 'of the Passion,' 'of the Holy Trinity,' 'of the Blessed Virgin Mary,' etc., which are contained in the Missal and Breviary. VO'TIVELY, ad. *-lĭ*. VOTING-PAPER, a balloting-paper; a proxy.

VOTING-MACHINE: device for mechanically indicating and recording the votes. The first patent for a voting-machine was granted to J. W. Rhines, of St. Paul, Minn., 1889, Mar. 4. The mechanism consists of an oblong box about 3 ft. long, 18 in. wide, and 8 in. deep. On the lid of this box are arranged keys in rows across the box to represent the offices, and in rows running lengthwise of the box to represent the entire ticket. Thus:

	1 Rep.	2 Dem.	3 Pro.	4 Labor.	5 Cit.
Governor	○	○	○	○	○
Secretary of State.	○	○	○	○	○
Treasurer	○	○	○	○	○

The keys have on them the names of the candidates plainly printed, and the party tickets are likewise indicated by color, the whole range of keys of each party being of a distinct color. Each key as pressed becomes automatically locked down and cannot be voted again, nor can any other ticket in that horizontal row. When the voter has completed his vote, he closes down an outer lid, which at once records his vote, and releases all keys in readiness for another vote; any attempt to raise the cover to repeat the vote rings a bell which calls the attention of the judges. The raising of the cover by a new voter acts as a tally of the number of votes cast, as each time that it is raised a numbering machine records the act.

On opening the machine at closing of the polls each candidate's vote is found numbered and recorded on a strip of paper, so that the entire vote can be immediately announced. The legislature of Michigan (1893) authorized the use of this machine in any municipality in the state. Other machines on similar principles have been invented and used in various localities. In 1893-4 Sylvanus E. Davis and Alfred J. Gillespie invented the 'Standard' and 'United States Standard' voting-machine. They are now in part use in several states. At Rochester, N. Y., 1898, 73 of these or similar contrivances were tried and pronounced available. Voting-machines have

been used in Buffalo, N. Y., since 1899. During the presidential election of 1900 78 machines were brought into use in various places. The Standard voting-machine has an upright keyboard with simple lever movements for voters to adjust. It is so arranged that by certain lever variations voters may readily register a split vote, also constitutional amendments and other special votes. The 'Abbott' and the 'Bardwell Votometer' are included in the record of voting-machines in use, either on trial or permanently.

VOUCH, v. *vowch* [OF. *voucher*, in *law*, to call to defend—used by a person whose possession was attacked when calling upon another to defend his right—from L. *vocārĕ*, to call—from *vox* or *vōcem*, the voice]: to give one's own guarantee for the matter in dispute; to attest; to warrant; to maintain by affirmations; to bear witness; in *OE.*, to obtest: N. in *OE.*, favorable testimony. VOUCH'ING, imp. VOUCHED, pp. *vowcht.* VOUCHER, n. *vowch'ĕr*, one who gives witness to anything; a paper or document which serves to attest the truth or correctness of accounts or disbursements; one who calls in another to make good his warranty of title; a vouchor. VOUCHEE, n. *vowch-ē'*, in *law*, one called into court to make good his warranty of title. VOUCH'OR, n. *-ŏr*, one who calls in another to make good his warranty of title.—SYN. of 'vouch, v.': to affirm; declare; confirm; asseverate; aver; assure; protest.

VOUCHSAFE, v. *vowch-sāf'* [*vouch*, and *safe*]: to warrant safe; to give sanction to; to assure; to condescend to grant; to condescend; to deign. VOUCHSA'FING, imp. *-sā'fĭng.* VOUCHSAFED', pp. *-sāft'.* VOUCHSAFE'MENT, n. *-sāf'mĕnt*, what is vouchsafed or granted in condescension.

VOUSSOIRS, n. plu. *vôs-swawrs'* [F. *voussoirs*—from a supposed mid. L. *volutĭārĕ*, to bend, to vault—from L. *volūtus*, pp. of *volvĕrĕ*, to turn]: in *arch.*, the stones which form the arch of a bridge, vault, etc., and which are cut in the form of a truncated wedge.

VOW, n. *vow* [F. *vœu*, a vow, a prayer—from L. *votum*, a vow, a thing solemnly promised; *vōtus*, pp. of *vovērĕ*, to vow: It. *voto*]: solemn promise made to God; solemn engagement to one's self to do something hereafter; formal promise, as of love or matrimony: V. to consecrate or set apart to God by solemn promise; to make a solemn promise. VOW'ING, imp. VOWED, pp. *vowd:* ADJ. consecrated by solemn declaration; sworn; declared. VOW'ER, n. *-ĕr*, one who makes a vow. VOW-FEL'LOW, n. in *OE.*, one bound by the same vow.—*Vows* appear to have formed part of the religious observance of almost all races in any degree civilized; and they pervaded the whole ceremonial system of the Mosaic dispensation (Gen. xxviii. 20; Lev. xxvii. 2; I Chron. [I Paralip. Vulg.] xxix. 9; II Chron. xxxi. 6; Judg. xi. 30; Num. xxx. 2; Judith xvi. 19; Jon. i. 16). The stringency of the obli-

gation of fulfilling a vow, when once made, is distinctly laid down (Deut. xxiii. 21; Eccl. v. 4, 5); but it is equally clearly stated that it is not a matter of obligation to make a vow (Deut. xxiii. 22). The practice of making vows continued among the Jews in the time of Christ; and the apostle Paul, after his conversion to Christianity, continued to conform to this usage (Acts xviii. 18). Not entering here into the question whether this observance was meant by the Lord Jesus to form part of his new dispensation, or discussing how far the practice of vows, especially of chastity, can be traced as in use among the Christians of the 1st and 2d c., we may say that it is quite clear that in the end of the 3d and through the 4th c. the monastic life under vows became general in the East, and soon afterward spread throughout the church (see ANTHONY; PAUL; MONACHISM).—Vows, discarded as a religious observance by the Reformers, have a large place in the system of the Roman Catholic Church. The objects of these engagements are very various; but they are drawn mostly from what are called the 'Evangelical Counsels' (q.v.), in distinction from 'precepts' or 'commands'—the most ordinary subject of vows being the so-called 'evangelical' virtues of poverty, chastity, and obedience. Pilgrimages, acts of abstinence, or other self-mortifications, whether of the body or of the will, special prayers or religious exercises, are frequently made the object of vows; and there is another large class of more material objects, e.g., the building of churches, monasteries, hospitals, and other works of public interest or utility, to which mediæval Europe was indebted for many of its most magnificent memorials of piety and of art (see VOTIVE). Vows in the Roman Church law are either 'simple' or 'solemn': the principal difference is in the legal effects of the 'solemn' vow, which, where the subject of such vow is chastity, renders not merely unlawful, but null and void, a marriage subsequently contracted. A 'simple' vow of chastity makes it unlawful to marry, but, except in the Jesuit Society, does not invalidate a marriage, if subsequently contracted. Roman Catholics acknowledge in the church a power of dispensing in vows; but this is held to be rather declaratory than remissory, and it is not acknowledged in the case of vows which involve any right of a third party. Bishops are held to possess the power of dispensing in simple vows generally; but the power of dispensing in solemn vows and in certain simple vows, e.g., that of absolute and perpetual chastity, and of the greater pilgrimages, is reserved to the pope. The practical operation of the canon law regarding vows has evidently been much modified in Roman Catholic countries since the French Revolution, and the subsequent political changes; but this must be understood to regard chiefly their external and purely juridical effects. So far as concerns their spiritual obligation, the modern Roman theology recognizes

little if any change. See Ferraris, *Bibliotheca Canonica;* André, *Cours de Droit Canon;* Welter and Wetse's *Kirchen-Lexicon.*

VOWEL, n. *vow'ĕl* [F. *voyelle,* a vowel—from L. *vocālis,* sounding, a vowel—from *vox* or *vōcem,* a voice: It. *vocale,* a vowel: F. *vocal,* vocal]: a distinct simple sound uttered by the voice; in English the vowels are *a, e, i, o, u,* and sometimes *w* and *y,* each of which represents a distinct sound, thus distinguished from the consonants, which represent imperfect sounds (see LETTERS): ADJ. pertaining to or having the quality of a vowel; vocal. VOWEL-POINTS, certain marks or signs employed to indicate vowel-sounds in such languages as the Hebrew, Arabic, etc. VOW'ELLED, a. *-ĕld,* furnished with or having vowels. VOW'ELISM, n. *-ĭzm,* use or frequency of vowels.

VOWEL: a simple articulated sound, which is produced merely by breathing, accompanied by a constriction in the larynx, a greater or less elevation or depression, expansion, and contraction of the tongue, and contraction or expansion of the lips. The vowel sounds of the English alphabet are imperfectly represented by five letters, *a, e, i, o, u* (and sometimes *w* and *y*); the deficiency of our alphabet may therefore be seen at a glance, when we mention that there are at least 13 distinct shades of vowel-quality in the spoken language as heard in the words *ale, an, ask, ah, all; ell, err; eel, ill; old, ore; pull, ooze.* The long sound of *i,* as in *ire,* and of *y,* as in *by,* although represented by one letter, are really compound vowel sounds or diphthongs. The French simple vowel sounds *u* and *eu,* and the German *ö* and *ü,* are not heard in the English language.

VOX, n. *vŏks* [L., a voice]: a voice. VOX-ANGEL'ICA, n. an organ-stop consisting of two ranks of pipes of small scale and delicate quality of tone, one of which is tuned slightly sharp, in order to produce a wavy and tremulous sound; called also *voix céleste, unda maris,* etc. VOX-HUMA'NA, n. one of the reed-stops in an organ intended to imitate the sounds of the human voice, consisting of a large reed and short tube; called *voce humana* in Italian, *voix humaine* in French, and also *anthropoglossa.* VOX POPULI, VOX DEI, *vŏks pŏp'ū-lī, vŏks dē'ī* [L. phrase]: the voice of the people is the voice of God.

VOYAGE, n. *voy'āj* [F. *voyage,* a journey—from L. *viatĭcum,* journey money or provision; in *mid. L.,* a journey—the L. *vĭa* becoming F. *voie,* way: Sp. *viage;* It. *viaggio*]: a passage by sea from one place or country to another; in *OE.,* travel; course; attempt: V. to pass across or over a sea to a distant place or country; to pass by water. VOY'AGING, imp. VOY'AGED, pp. *-ājd.* VOY'AGER, n. *-ā-jėr,* one who passes or journeys by sea. VOY'AGEABLE, a. *-ā-bl,* that can be passed over or navigated. VOYAGEUR, n. *vwâ-â-zhėr'* [F., a traveler]: one of a class of men employed by the fur companies of Canada

and Hudson Bay territory in transporting goods to and from distant stations.

VOYAL, n. *voy'ăl*, or VOY'CL: among *seamen*, a large rope sometimes used in weighing anchors.

VOYNICH, *voi'nĭeh*, ETHEL LILLIAN BOOLE: English novelist: b. 1864. She was a daughter of G. Boole (q.v.), and was married to W. M. Voynich, a Polish writer in England. She is the author of *Russian Humor; Stories from Garshin; The Gadfly* (1897); *Jack Raymond* (1901); etc.

VOYSEY, *voy'zĭ*, CHARLES: English theistic preacher: b. London, 1828, Mar. 18. He took the degree A.B. at Oxford 1851; was ordained priest in the Established Church, and became curate of Hessle, near Hull; held a curacy in Jamaica 1859-61; returning to England, held in succession four curacies, and 1864 became vicar of Healaugh, Yorkshire. In the meantime he had preached against the orthodox doctrine of hell. He now began to circulate his opinions about various church dogmas through the press, and published (1864) a sermon, *Is Every Statement in the Bible about Our Heavenly Father Strictly True?* The next year he began a monthly publication, *The Sling and the Stone*. He was tried for heretical teaching and found guilty by an ecclesiastical court 1869, Dec. 1; the judicial committee of the privy council confirmed the judgment and ordered him deposed 1871, Feb. 11. Voysey then became minister of a 'theistic church' in London. He is author of *The Mystery of Pain, Death, and Sin; The Sling and the Stone* (1872-93); *Theism as a Religion of Common Sense* (1894); *Theism as a Science of Natural Theology and National Religion* (1895); *Testimony of the Four Gospels concerning Jesus Christ* (1896); etc.

VRAISEMBLANCE, n. *vrā'sâng-blângs* [F. *vrai*, true; *sembler*, to seem]: the appearance of truth; verisimilitude.

VRED'ENBURG, EDRIC WALCOTT: English novelist: b. Para, Brazil, 1860, March 29. He was educated at Tonbridge School, Kent, entered the army and was a lieutenant in an Essex regiment. Among his works may be cited: *The Haunted House in Berkeley Square; A Bitter Inheritance; At the World's Mercy; By the Queen's Command.*

VR'IHASPATI, *vrē-hŭs'pa-tē*, or, as in Vedic works, BR'IHASPATI [from Skr. *br'ih*, probably hymn, prayer, and *pati*, protector, lord]: in Vedic mythology, the guardian of the hymns or prayers addressed by the pious to the gods; therefore considered as mainly instrumental in insuring the efficacy of the sacrifice. He is 'the first-born in the highest heaven of supreme light,' because the prayers reach him first; he is 'seven-faced,' because his faces are the seven Vedic meters; and he is 'attended by all the companies of gods,' or 'represents all gods,' when the sacrifice

is performed. Being thus the 'first sharer of the offering,' he is sometimes also identified with *Agni*. His function of guardian of the hymns being similar to that of a priest and spiritual teacher, he is further represented as a priest of the gods, who himself 'celebrates worship,' and as imparting 'virtuous instruction.' In the epic and Purânic mythology, V. figures especially as preceptor of the gods and R'ishis, as such causing them to perform sacrifices.

VR'ITRA: see INDRA.

VUGH, or VUGG, n. *vôg* [prov. F. *voig*, a variant of F. *vide*, void, empty (see VOID)]: in *mining*, a cavity or vacant space in a lode or metalliferous vein. VUGHY, a. *vûg'ĭ*, empty; hollow.

VULCAN, *vŭl'kan* [name probably connected with *fulgere* and *fulgur*, thence the 'bright or shining one'; comp. Skr. *ulka*, firebrand]: the old Italian god of fire. The various myths in connection with V. prove the great antiquity of his worship. Latterly the character, attributes, and history of the Greek Hephæstus were transferred to V., and the two thus became identified. According to Homer, Hephæstus was the son of Zeus and Hera; later accounts, however, asserting that the latter gave birth to him without co-operation of her husband. He appears to have been twice violently expelled from Olympus—the first occasion shortly after his birth, when he was dropped on the earth by his mother, who was disgusted with his sickly deformity; he was received by the marine divinities Thetis and Euronyme, with whom he dwelt for nine years. He afterward returned to Heaven, and, interfering in a quarrel between his mother and Zeus, the latter seized him by the leg, and flung him from Olympus. After falling for a whole day, he alighted on Lemnos, where he was kindly received by the Sintians. He afterward returned to Olympus. Homer makes him lame from his birth: later writers attribute this defect to his second fall on Lemnos. The popular notion of V. or Hephæstus appears to have been that of a burly, lame, good-natured, awkward god, often the butt and laughing-stock of his fellows. He had a magnificent palace in Olympus, 'immortal, brazen, shining like stars,' in which was his workshop, containing an anvil and 20 bellows, which worked at his command. Later accounts locate his workshop in the interior of some volcanic isle, such as Lemnos, Lipara, Sicily, etc., and give him as workmen the Cyclopes, Brontes, Steropes, etc. Many wonderful works of art are ascribed to V. by the ancient poets; and as an artist or artificer he appears to have been regarded as corresponding in some respects to Athene: both instructed men in the useful and ornamental arts, had the power of healing, etc., and at Athens had temples and

festivals in common. In the *Iliad* the wife of Hephæstus is Charis; while in the *Odyssey*, and in later writers, he is represented as being tormented by the amours of his frail and charming spouse Aphrodite with her favorite Ares (Mars). In the earlier statues his lameness appears to have been indicated; but latterly he was represented as a full-grown, vigorous man with a beard.

VUL'CAN, suppositious infra-Mercurial planet. The hypothesis of V., or of a planet revolving in an orbit between Mercury and the sun, was put forth by the French astronomer Leverrier (q.v.) 1859: he inferred the existence of a planet between Mercury and the central orb from a movement of Mercury's perihelion that could not be accounted for on any other hypothesis. Another French astronomer, Dr. Lescarbault, asserted that 1858, Mar. 25 (6 months before Leverrier's hypothesis was published), he had seen the suppositious planet crossing the sun's disk. A similar observation was supposed to be made by two astronomers in the Paris observatory during the time when—according to the hypothesis—its transit was due, 1876, Oct.; but observers elsewhere did not see it then, nor has it been seen since; and the existence of V. is now regarded as practically disproved by the negative results of subsequent observations.

VULCANIAN, a. *vŭl-kā'nĭ-ăn* [L. *Vulcānus*, in *anc. myth.*, the god of fire]: pertaining to Vulcan (q.v.); relating to volcanoes; volcanic; relating to the theory of the vulcanists. VULCANIZE, v. *vŭl'kăn-īz*, to change the properties of India-rubber by causing it to combine with sulphur and white lead by the agency of heat. VUL'CANIZING, imp. VUL'CANIZED, pp. *-īzd*. VUL'CANIZA'TION, n. *-ĭ-zā'shŭn*, the art or process of changing the properties of India-rubber by combining it with sulphur and white lead by means of heat. VUL'CANISM, n. *-ĭzm*, or VUL'CANIC'ITY, n. *-ĭs'ĭ-tĭ*, the thermal phenomena, ascribed to the constantly active reaction of the interior of the earth upon its external crust or surface. VUL'CANIST, n. *-ĭst*, one who contends that igneous action was present in the formation and modification of the earth's crust. VUL'CANITE, n. *-īt*, volcanic garnet, so called from its occurrence in ejected blocks and lavas: India-rubber hardened by vulcanization (see CAOUTCHOUC). VULCANOL'OGY, n. *-ŏl'ŏ-jĭ*, the department of physical science which relates to volcanoes and other igneous action on the earth's surface. VULCANOL'OGIST, n. *-jĭst*, one who studies vulcanology.

VULCANO, *vôl-kâ'nō*, or VOLCA'NO, *vŏl-*: most southern of the Lipari Islands (q.v.), in the Mediterranean, 12 m. from the n. coast of Sicily; about 7 m. long and 3 m. wide. Near the centre is a crater one-fourth of a m. in circumference, which constantly emits smoke and

vapors. The highest point of this crater, which is also the highest point of the island, is 1,601 ft. Only the s. part of the island is fertile. The products are grapes, wine, fruit, corn, and flax.

VULGAR, a. *vŭl'gĕr* [F. *vulgaire*—from L. *vulgārĭs*, belonging to the great mass or multitude, general—from *vulgus*, the multitude: It. *vulgare*]: common; vernacular, as in the *vulgar* tongue; offensively mean or low; rude; unrefined; in *OE.*, public; commonly rumored; consisting of common people: N. the common people; in *OE.*, a vulgar or common person; the common language. VUL'GARLY, ad. *-lĭ*. VULGARITY, n. *vŭl-găr'ĭ-tĭ*, coarseness or clownishness of manners or language; mean or gross mode; absence of refinement and good taste; rudeness of manners. VUL'GARIZE, v. *-gĕr-īz*, to make vulgar. VUL'GARIZING, imp. *-ī-zĭng*. VUL'GARIZED, pp. *-īzd*. VUL'GARISM, n. *-ĭzm*, coarseness; vulgarity; a vulgar phrase or expression. VULGA'RIAN, n. *-gā'rĭ-ăn*, one who indulges in vulgarisms or in vulgar ideas. VULGAR FRACTIONS, fractions written in the usual or common manner, as distinguished from *decimal* fractions.

VULGATE, n. *vŭl'gāt* [F. *vulgate*—from mid. L. *vulgāta*, the Vulgate—from L. *vulgātus*, pp. of *vulgārĕ*, to publish—from *vulgus*, the multitude]: the Latin version of the Scriptures used in the Rom. Cath. Chh. service: ADJ. pert. to or contained in the Vulgate.—The *Vulgate* is the received version in the Rom. Cath. Church. It must not be confounded with the older Latin translation known as the Itala (see ITALIC VERSION, under ITALIAN). While Jerome was correcting the Itala, he conceived the plan of producing a completely new version of the Old Test., from the Hebrew text itself. He began this labor about 385 and completed it 405. He also made an improved version of the Italic New Test., and the two together received the name V. The discrepancies between the V. and the Itala, which had been made from the LXX., were so numerous and important that the charge of heresy and falsification of Scripture was openly preferred against the translator by Rufinus, and even St. Augustine was doubtful for some time whether this charge might not be true. But gradually the V. made its way in the church, first in Gaul, then in Rome—chiefly through Gregory the Great—and finally throughout the West. About 200 years after Jerome's death (he d. 420), it became the universally received version of the church. In 802, however, the text of the V. had become so corrupted that Charlemagne commissioned Alcuin to revise it by old MSS., and to compare it with the original texts. This revision, to which afterward came other 'emendations,' in the 11th and 12th c. (by Lanfranc, Abp. of Canterbury, and Cardinal Nicolaus respectively), completely changed the original character of the work. Nor did the 'Correctoria Biblica' (i.e.,

certain collections of commentated and revised texts, issued at the period) do much for improvement of the corrupted MSS. The confusion between the different codices was chiefly remarked when the Tridentine Council, 1546, first declared the V. the authorized version of the Roman Church, and decreed the preparation of an authenticated edition. In 1564 the papal chair undertook the task; but not before 1590 did Sixtus V. produce the work. This, however, turned out to be so utterly incorrect and faulty that the copies were speedily suppressed; and another edition, which appeared 1592, was prepared under Clement VIII., to which (1593) that other edition succeeded which has since remained the normal edition of the Church of Rome, and has been reprinted unchanged ever since. The Anglo-Saxon translation of the Pentateuch and Joshua, by Aelfric (10th c.), was made from the V., and not, as has been erroneously supposed, from the Septuagint. The V. has been repeatedly translated into Arabic (the Psalms even into Persian) for the use of the Rom. Catholics in the East.

VULNED, *vŭl'nĕd:* in *heraldry*, wounded—e.g., a human heart, wounded, and with the blood dropping from it.

VULNERABLE, a. *vŭl'nĕr-ă-bl* [F. *vulnérable*—from L. *vulnerārĕ*, to wound—from *vulnus*, a wound]: that may be wounded; liable to injury. VUL'NERABIL'ITY, n. *-bĭl-ĭ-tĭ*, quality of being vulnerable or liable to injury; also VUL'NERABLENESS, n. *-bl-nĕs*. VUL'NERARY, a. *-ĕr-ĭ*, useful in healing wounds: N. any plant or drug which is useful in healing wounds. VUL'NERA'TION, n. *-ā'shŭn*, in *OE.*, the act of wounding. VUL'NEROSE, a. *-ōs*, covered with wounds.

VULPINE, a. *vŭl'pīn* [L. *vulpīnus*, belonging to a fox—from *vulpēs*, a fox: It. *volpino*]: pertaining to or resembling the fox: cunning; artful. VUL'PICIDE, n. *-pĭ-sīd* [L. *vulpēs*, a fox, and *cædo*, I kill]: one who kills foxes as vermin instead of preserving them for hunting; the killing of foxes.

VULPINITE, n. *vŭl'pĭn-īt* [from *Vulpino*, in Italy]: a granular variety of gypsum which takes a fine polish and is used for ornamental purposes.

VULTURE, n. *vŭl'tūr* or *-chûr* [L. *vultur*, a vulture—probably from *vello*, I pluck or tear]: large rapacious bird of prey of the family *Vulturidæ*. VUL'TURINE, a. *-ĭn*, pert. to or resembling the vulture. VUL'TURISH, a. *-ĭsh*, like a vulture; rapacious; also VUL'TUROUS, a. *-ŭs*. —The *Vultures* (*Vulturidæ*) of the old world have a longer beak than the Falcons (*Falconidæ*), and it is straight at the base, slightly or not at all toothed, the upper mandible longer than the lower, and hooked at the tip: the head is generally bare, or covered only with

a short down, which in most of the species is the case also with the neck—a ruff or collar of soft feathers surrounding the lower part of the neck, into which the upper part, and even most of the head, can be withdrawn. The legs and feet are large; but the claws are not nearly so large and strong as in the *Falconidæ*, and are but slightly hooked. The middle toe is very long. The wings are long, and their expanse consequently great. Vultures have great powers of flight, and many of them soar to a very great height. Their plumage has not the neat and regular appearance of that of the Falconidæ, but it is dense, and not easily penetrated by shot. Vultures are found mostly in warm climates, and many are inhabitants of mountainous regions. They feed on carrion, which it seems to be their office in nature to remove from the face of the earth, that the evil consequences of its corruption may be prevented. They seldom attack a living animal; but they have been seen to sit and watch the approach of death, waiting for their feast; and great numbers have been seen on battle-fields, assembled to devour the dead. They are not in general courageous, and are often put to flight by much smaller birds; yet, if unmolested, they readily become familiar with the presence of man, and some of them seek their food even in the streets of towns, in which they are useful scavengers. They gorge themselves excessively when food is abundant, till their crop forms a great projection, and sit long in a sleepy or half-torpid state to digest their food. They do not carry food to their young in their claws, but disgorge it for them from the crop. The bareness of their head and neck adapts them for feeding on putrid flesh, by which feathers would be defiled; and they are very careful to wash and cleanse their plumage. The question has been much discussed whether vultures discern dead animals by the eye, or are attracted to them by the smell. It is certain that they possess great powers both of smell and of vision, and the reasonable conclusion appears to be that both are of service in directing them to their prey.

The *Vulturidæ* are divided into several genera, of which one, *Gypaëtos*, approaches to the *Falconidæ* in characters and habits, having the head feathered, and feeding not always on carrion, but often attacking living animals: the Lämmergeier (q.v) is one of this group. The feet are feathered to the toes, while the other vultures have the tarsi bare.

Some notable species of V. are described under their respective titles (see EGYPTIAN VULTURE: ETC.). The generic name *Vultur* is now restricted to those which have the head and neck without feathers and without caruncles, and a ruff of long feathers down at the lower part of the neck. To this genus belongs the TAWNY V., or GRIFFON (*V. fulvus*) found in s. Europe, n. Africa, and

w. Asia. It makes its nest on the most inaccessible rocks of high mountains, as in the Alps and Pyrenees, and sometimes in tall forest-trees. It is a very large bird, more than four ft. in length. Its plumage is yellowish brown, the quills and tail-feathers blackish brown, the down of the head and neck white, the ruff white. When it has found a carcass on which to feed, it remains on the spot, gorging and torpidly resting by turns, till no morsel remains. This V. has been seen in England, but only as an accidental visitor. The mountains and forests of s. Europe, as well as of n. Africa and great part of Asia, are inhabited also by the CINEREOUS V. (*Vultur* or *Gyps cinereus*), another large species, which departs from the typical character of the vultures in having the greater part of the neck feathered, and comparatively large and powerful claws: it does not attack living animals. India, Africa, and almost all warm countries abound in vultures of different species.

The New World Vultures, so called, are quite distinct, and form the family *Cathartidæ*. Their habits and feeding are like the true vultures of the old world, but they have less of the falcon element, approach mostly the gallinaceous character (the Turkey Buzzard even resembling its namesake), and are weak and given to a hopping mode of progression when on their feet, though powerful in long and high flight. The Condor (q.v.) of S. America is the grandest example. In the southern states of N. America is found the BLACK V. (*Cathartes atratus*), there generally known as the CARRION CROW, a comparatively small species, not quite 2 feet. in entire length, of deep black color, head and neck covered with warty excrescences and a few hair-like feathers. This bird is very abundant also in many parts of S. America, where it is called the GALLINAZO. Very nearly allied to it, and found in the same regions, is the TURKEY BUZZARD, or RED-HEADED V. (*Cathartes aura*). These vultures are more or less gregarious, not only assembling where food is to be found, but flying in flocks. They make their nests in hollow trees, and sometimes in the chimneys of deserted houses, or on the roofs of houses. In some towns of tropical America they may be seen in great numbers, perched during the heat of the day on the tops of houses or on walls, asleep, with their heads under their wings. The CALIFORNIAN V. (*Cathartes Californianus*) is the largest of this family in N. America, being fully 4 ft. long, and about 9 ft. in extent of wings: it is black, with a white band on the wings; found among and w. of the Rocky Mts. In habits it resembles the condor.

VULVA, n. *vŭl'va* [L. *vulva* or *volva*, wrapper or integument]: in *anat.* and *zool.*, an entrance or opening. VULVIFORM, a. *fawrm* [L. *forma*, shape]: in *bot.*, like a cleft with projecting edges.

VYASA: legendary personage, reputed arranger of the Vedas, and reputed author of the Mahâbhârata, the Purân'as, the Brahmasûtras (see VEDANTA), and of a Dharmas'âstra: according to tradition, son of the sage *Parâs'ara* and *Satyavatî*, 'the truthful,' who was a daughter of King Vasu and a heavenly nymph, Adrikâ. That the immense bulk of literature comprised by the above-named works, and relating to different periods, cannot belong to the authorship of one and the same personage, is beyond doubt. But the name itself indicates the meaning of its connected legends: it signifies 'arranger,' 'distributer.' Vyâsa is, therefore, a symbolical personification of the work of generations, as embodied in the Vedas, the Mahâbhârata, and the Purân'as.

VYATKA, or VIATKA: Russia; (1) a town, capital of the government of same name, advantageously situated near its center in a beautiful district at the confluence of the Klinovka with the Vyatka, 458 m. by rail w. of Perm. It has two cathedrals and also monasteries. There is steamer communication with Kazan. Pop. 24,894. (2) The government has an area of 59,329 sq.m. Flax and hemp are important crops, and among the chief minerals are iron and copper, which are extracted and smelted. There are manufactures of woolens, linens, potash, leather, firearms, anchors, gun-carriages, etc. Pop. 3,082,788.

VYAZMA, or VIAZMA, *vē-âz'mâ:* town of Great Russia, government of Smolensk; on the Vyazma; 109 m. e.n.e. of the town of Smolensk. It is mentioned first 1239, and, after being controlled successively by the Lithuanians and Poles, it finally became Russian 1634. Vyazma has active trade in grain, flax, hemp-seed, tallow, etc.; and is the entrepôt for goods exported to St. Petersburg and Riga. Pop. about 13,000.

VYING, v. *vī'ing* [see VIE]: competing.

VYRN'WY: a river of Wales, rising in the n.w. of Montgomeryshire, and after a circuitous course of some 35 m. falling into the Severn on the Shropshire border. Lake Vyrnwy, not far from its source, the chief reservoir of the Liverpool waterworks, completed in 1892, was formed by constructing a huge dam or embankment across the river valley, a former glacial lake basin, the result being an artificial sheet of water about 5 m. long with an area of 1,121 acres and an available capacity exceeding 12,000 million gallons. The length of the embankment is 1,260 ft., its height 60, the length of the aqueduct to Liverpool 68 m.

W

W, or w, *dŭb′l-ū:* 23d letter of the English alphabet, and a consonant, named from its printed character representing a double V, V being the Roman form of our U. W performs the double office of a consonant and a vowel; it is a consonant when commencing a word or syllable, as *w*in, *W*averley, and a vowel at the end of a word or syllable, but only when preceded by a vowel, as pa*w*, no*w*, gre*w*, thus forming the latter element of a diphthongal sound. According to the experiments of Prof. Willis (*Cambridge Phil. Trans.*, III. 231), the natural order of the vowels is *i, e, a, o, u,* or the reverse; in which the sounds must be understood to be those which prevail on the continent of Europe. The sounds, then, of *i* (that is, *ee*) and *u* (that is, *oo*) are the most remote, and the attempt to pass with rapidity from either of these to the others, particularly to the other extreme, gives an initial breathing which has the character of a consonant—viz., in one case, *ee-oo,* or *you;* in the other, *oo-ee,* or *we:* see Key's *Alphabet.* This acute analysis of the articulations denoted by the characters *w* and *y* throws a clear light on their double function as consonants and as vowels. The letter *w,* which originated in the middle ages, is merely one *v* joined to another, as its English name imports. It is peculiar to the English, German, and Dutch alphabets. It appears, from a variety of phenomena in Latin and Greek, that the L. *v.* or *u,* used as a consonant, as well as the old Greek digamma (F), were more of the nature of the modern *w* than of the decidedly consonantal English *v* (see U and V). The French, having, like the other Romanic nations, no character *w,* express the sound by prefixing *ou* to the vowel —as *oui* (pron. *wee*), Edouard=Edward. In the beginning of proper names they substitute *gu,* e.g., Guillaume =William. The Spaniards also use *gu,* as in the many names compounded of the Arabic *wadi,* e.g., Guadalquivir; but more frequently *hu,* as in Chihuahua (pron. *Chiwawa*). In High German, which has become classical German, *w* is confounded with *v,* and *v* with *f;* thus. Wellington is pronounced *Vellington.* Among the lower classes in London *w* is substituted for *v,* and *v* for *w,* with 'a most amusing perversity'; compare the utterances of Sam Weller and his father in Dickens's *Pickwick Papers.*—In *chem.* W is the symbol for *tungsten* (L. *Wolframium*). As an abbreviation W stands for *west, western, westerly, William, Wednesday, Welsh,* etc.

WAAHOO′, or Wahoo: a small tree (*Ulmus alata*) of the southern United States, having small ovate, often falcate, leaves and spreading branches, which form an open, rounded head. The branches have wide, wing-like corky

ridges, which have suggested the name winged elm. The tiny samaras are edged with a silky fringe. The tree, while growing naturally in damp places, is a valuable roadside shade-tree, where it is hardy. It has a chocolate-colored fine-grained heart-wood, which has been used in the South for wheel-hubs. The spindle-tree (*Euonymus americanus*) is also called waahoo.

WAAL, *vâl,* THE (L. *Valis* or *Vahalis*): arm of the Rhine; thrown off near the village of Pannerden, in the Netherlands, flowing thence to Nijmegen, Tiel, Nieuw-St.-Andries, between the Boemmeler- and Tieler-waard, and uniting with the Maas below Fort Loevestein (Luvestein). The united rivers there take the name Merwede, which, flowing past Gorinchem and Dordrecht, becomes the Oude, or Old Maas. See MAAS.

WABASH, *waw'bŏsh:* river of the United States; rising in w. Ohio, flowing w. and s.w. through Indiana, forming the s. half of the boundary-line between Illinois and Indiana, and joining the Ohio river at a point 146 m. from its mouth. The Wabash is 550 m. long, and at high water is navigable by steamers for 300 m. Its principal branches are the Tippecanoe, Big Vermilion, Embarras, and White river—the last 200 m. long. The Wabash and Erie canal connects the lakes with the Mississippi.

WABASH: Ind.; city, county-seat of Wabash co.; on the Wabash river, and on the Cleveland, C. C. & St. L., and the Wabash railroads; about 90 m. n.e. of Indianapolis and 130 m. s.e. of Chicago. It is in an agricultural and stock-raising region, but it has considerable manufacturing interests. In 1900 (government census) the city had 109 manufacturing establishments, with capital invested $2,430,502. The number of wage-earners was 1,241; and the average annual amount paid in wages was $589,355. The cost of material used was $1,206,726, and value of annual products was $2,225,990. The chief manufactures are flour, paper, spokes, carriages, woolen goods, machine shop products, lumber products, shoes, and hats. There are railroad repair shops, lumber and coal yards. The principal public buildings are the Soldiers' Memorial Hall, Masonic Temple, Woman's Orphan Home, and the county court-house. There are three parks. The educational institutions are a high school, graded schools, Wabash City Library, and a high school library. There are four banks, three national and one private. The first settlement was made in 1837 and the same year the town was incorporated. In 1866 it was chartered as a city. The government is administered under the charter of 1866, which provides for a mayor, who holds office two years, and a council. Pop. (1910) 8,687.

WABASHA: Minn.; city, county-seat of Wabasha co.; on the Mississippi river, and on the Chicago, Milwaukee & St. Paul railroad; about 30 m. n.w. of Winona and

about 100 m. s.e. of St. Paul. Lake Pepin, an expansion of the Mississippi, is about 2 m. above the city. Wabasha is in a fertile agricultural region, and has several manufactories, chief of which are flour and oatmeal mills, foundry, machine shop, lumber mill, soap factory and a church furniture factory. The national bank has (1903) a capital of $50,000 and deposits of $250,000. Pop. (1900) 2,528; (1910) 2,622.

WABASH COLLEGE: located at Crawfordsville, Ind. It was established by four Presbyterian missionaries in 1832, was first opened to students in 1833, and obtained a charter from the legislature in 1834; the present site of the college was purchased in 1835. Though affiliated with the Presbyterian Church, the college is non-sectarian in control; the board of trustees number 21, of whom four are representatives of the alumni. Wabash is distinctively a small college aiming to give thorough college training, but not to do technical or university work. It is not co-educational, in which respect it stands almost alone among the colleges of the West and Middle West. There is a fellowship in English, a students' loan fund, and many prizes. A summer school under private control is conducted on the college grounds, work in which may count toward a degree. There is also a preparatory course. The college grounds contain 40 acres located in the heart of the city. On this campus are South Hall (occupied by the biological department and the museum), Center Hall, the gymnasium, Peck Scientific Hall, and Yandes Library Hall. The library contains 45,000 volumes; the students number 300, and the faculty 23.

WABBLE, v. *wŏb'bl* [see also QUAVER: Bav. *waibeln*, to stagger, to totter: Low Ger. *wabbeln, quabbeln,* to shake like jelly or boggy ground]: to sway to and fro; to incline unsteadily from one side to the other, as a spinning top that is about to fall, or the like; to move staggeringly from one side to the other: N. a swaying or staggering to and fro. WAB'BLING, imp. *-blĭng:* ADJ. having an irregular motion from side to side. WABBLED, pp. *wŏb'bld.* WABBLY, or WOBBLY, a. *wŏb'blĭ,* inclined to wabble; unsteady.

WAC'CAMAW: a tribe of North American Indians who, in the 18th c., lived on Waccamaw river of eastern South Carolina. They are last mentioned in 1755, after which date, it is supposed, they became incorporated with the Catawbas. From their association, the Waccamaws are believed to have belonged to the Siouan stock.

WACCAMAW: a river which has its rise in the s.e. part of North Carolina, and is the outlet of Waccamaw lake. It flows s. into South Carolina and joins the Great Pedee on the southern boundary of Horry co. Below the confluence of the rivers, the stream is often called Waccamaw. It enters the ocean through Winyah bay. From the source of the Waccamaw to the Great Pedee is about 130 m.

WACE, Henry: English Anglican clergyman: b. London, 1836, Dec. 10. He was educated at Marlborough, Rugby, King's College, London, and Brasenose College, Oxford. He served curacies at Saint Luke's, Berwick street, London, 1861-3, and St. James', Piccadilly, 1863-9, and Grosvenor Chapel 1870-2, was chaplain of Lincoln's Inn 1872-80, and preacher there 1880-96. He was professor of ecclesiastical history in King's College 1875-83, in 1881 became a prebendary of St. Paul's, and in 1883 chaplain to the Archbishop of Canterbury and principal of King's College. He was Boyle lecturer (*Christianity and Morality*) (1874-5) and Bampton lecturer (*The Foundations of Faith*) (1879), but is best known as joint editor with Sir W. Smith of the great *Dictionary of Christian Biography* (1877-87), and as himself the editor of the *Speaker's Commentary on the Apocrypha* (1886).

WACE, *vâs*, Robert (?): Anglo-Norman poet: b. in the island of Jersey, about 1120; d. in England about 1180, certainly before 1184. Many different versions of his name are given in his own books and in others which mention him. He is styled Vace, Wace, Waece, Waice, Waicce, Waze; Gasse, Gaice, Guace, Guazi, Guaze, Guascoe, Gazoe; and, again, Wistace, Huistace, Huace. It has been supposed that there were really two poets, one named Wace or Guace, the other named Wuistace; one the author of *Le Roman du Rou*, the other of *Le Roman du Brut*. About his Christian name there is even more doubt than about his surname: it is never mentioned in his poems—the source of the little known about him. An old writer speaks of him as Matthew; and he was called Robert first in the *Origines de Caen* by Huet.

Wace was taken to Caen as a child, and there received his early education. He was afterward sent into the neighboring kingdom of France; but he returned to Caen, and, having entered into holy orders, became a reading-clerk in the Royal Chapel there. It was at Caen that he composed his works. Henry II., to whom he dedicated *Le Roman du Rou*, gave him a canonry at Bayeux, apparently about 1160.

Five separate works are attributed to Wace; but three are slight performances, and it is necessary to notice only two—*Le Roman du Brut d'Angleterre* and *Le Roman du Rou*, the former entirely and the latter partly in octosyllabic couplets. The former premises that a certain Brutus, son of Ascanius and grandson of Æneas, settled in Britain and became its first king. The book continues the history of the British kings from Brutus to Cadwallader, who died at Rome shortly before 700. It is little more, however, than a literal translation into the French from the Latin of Geoffrey of Monmouth. This poem seems to have been completed 1155. *Le Roman du Rou* (Rollo) is a sort of history of the Dukes of Normandy

and of the Norman monarchy in England. Neither of these works has the slightest poetical merit. They are interesting only as showing the state of the French language in the 12th c., and as supplying occasional facts and social traits to the historian.

WACHUSETT, *waw-chô'sĕt*, MOUNTAIN: near the village of Princeton, Worcester co., Mass.; 16 m. n.w. of Worcester, 8 m. s.w. of Fitchburg; 2,016 ft. above sea-level. It commands a fine and extensive view, and has many summer visitors.

WACKE, n. *wăk'ĕ* [Ger.]: German miner's term for a soft earthy variety of trap-rock of grayish-green color, resembling indurated clay, and readily crumbling down when exposed to the weather; a sedimentary rock of basaltic or trap material. It is often vesicular, and when the cavities are filled it becomes an amygdaloid.

WACO: Texas; city, county-seat of McLennan co.; on the Brazos river at the mouth of the Bosque, and on the San Antonio & A. P., the Missouri, K. & T., the Waco & N. E., the Saint Louis S. W., the International & G. N., the Houston & T. C., and the Texas C. railroads; about 94 m. n. by e. of Austin and 85 m. s. by w. of Dallas. Waco is in a fertile agricultural region in which grain and cotton are the chief products.

Industries.—In 1900 (government census) the city had 166 manufacturing establishments, representing 63 different industries. The capital invested in manufacturing plants was $2,096,741; the number of wage-earners 1,227, and the average annual amount paid to wage-earners $469,129. The amount paid annually for raw material was $1,477,642, and the value of the annual products was $2,693,907. The chief manufactures were cotton products, printing plant products, men's clothing, wagons and carriages, watches, and foundry and machine shop products. The products of the saddlery and harness works were, for 1900, $427,431, and ranked first in value among the industries of the city. Mineral and soda waters brought a combined revenue of $77,433. Waco ranked seven among the cities of Texas in the value of manufactured products. The city is the principal interior cotton market of the state. It is the great distributing center between Austin and Dallas.

Municipal Improvements.—The city is well laid out, the streets are broad; over 60 m. are paved with asphalt, macadam, and gravel. The sewer system is excellent. The waterworks are owned by the municipality. There are a number of artesian wells, which have a medicinal value sufficient to attract many health seekers. A tubular-well system furnishes daily nearly 6,000,000 gallons of water. Several bridges span the Brazos river, one a suspension bridge with 475 ft. span. A cantilever bridge, for wagon traffic, built in 1901 by the city and county, cost nearly $110,000.

Public Buildings.—The principal public buildings are

the government building, county court-house, the churches, schools, banks, and some of the business blocks. The court-house, finished in 1903, is built of Texas limestone, and cost nearly $300,000. The city has hospitals, sanatoriums, and an Orphans' Home.

Churches and Schools.—There are 47 churches, representing nearly all denominations. The educational institutions are four colleges; Baylor University (Bapt.), opened in 1845; Texas Christian University (Christian), opened in 1873; Saint Basil's College (R. C.), opened in 1900; Paul Quinn College (African Methodist Episcopal), opened in 1881. There are four institutions doing high school work: two public high schools, the central, for white pupils, and the high school for colored pupils. The Douglas-Schuler School (M. E. So.), and the Academy of the Sacred Heart are private schools doing high school and more advanced work. There are 13 ward public school buildings and one Roman Catholic parish school. Waco has two business colleges, which have a high standing, one city library (building cost about $30,000), and several school libraries.

Banks and Finances.—Waco has four national banks, two savings banks, and one state bank, capitalized for nearly $1,500,000. The municipal receipts and expenditures are over $400,000. The chief items of expense are the schools and the interest on the bonded and floating debt.

Waco was surveyed as a town in 1849 and incorporated in 1850. Its growth in population has been steady and has more than kept pace with the growth in commerce. The rich surrounding country furnishes raw products sufficient for the support of a large manufacturing and commercial city. Pop. (1910) 26,425.

WAD, n. *wŏd* [AS. *wed;* Goth. *wadi;* Icel. *ved,* a pledge (see also WED)]: in *Scot.,* a pledge: V. in *Scot.,* to pledge or wager. WADSET, or WADSETT, n. *wŏd'sĕt* [Icel. *vedsetja,* to pledge, to pawn]: a pledge; formerly, in *Scots law,* a legal deed in which a debtor empowers his creditor to uplift the rents of his estate till the debt is satisfied —nearly equal in meaning to mortgage; the modern name is *Bond and Disposition in Security.* WAD'SETTER, n. *-sĕt-tẽr,* one having his authority from a wadset; a kind of mortgagee.

WAD, n. *wŏd,* or WAD'DING, n. *-dĭng* [Ger. *watte;* Sw. *vadd,* wadding: Ger. *wat,* cloth: AS. *wæd,* a garment]: a bundle or bunch of something soft; soft stuff, of a loose texture, as cotton, wool, etc., used in stuffing and lining garments; a wisp of straw; a piece of cloth, paper, leather, or tow, rammed into a gun on top of the powder or bullet to keep the charge in place. WAD, v. to line with a soft substance; to ram a wad into; to make into wad. WAD, n. name given in Cumberland, England, to black-lead, a mineral found in detached lumps and not in veins. WAD, or WADD, n. *wōd,* a miner's term for an

earthy oxide of manganese occurring in beds and incrusting veins and fissures in the older rocks. To WAD A GARMENT, to line it with flocks of cotton compacted together. WAD'DING, n. a material for wads; sheets of carded cotton for stuffing and lining garments, etc.

WADAI, *wâ-dī'*: Mohammedan kingdom in e. Sudan (see SUDAN); e. long. 18° 30'—about 22°, and n. lat. 9°—17°. On the n. it touches the Sahara, on the e. the Egyptian province Darfur, on the s. Bagirmi and other negro states. It is a powerful state, and claims exclusive ivory and slave-hunting rights in the basin of the upper Shari. In the n. the country is arid; but in the middle and on the e., in which are the sources of the rivers Batha and Betheca and Bahr-es-Salamat, the soil is fertile. Cap. Abeshr, on the Batha. The productions are maize, durra, cotton, indigo. Area 172,000 sq.m.—Pop. est. 2,600,000.

WADDEL, *wâd-dĕl'*, JAMES, D.D., Presb. clergyman: 1739, July—1805, Sept. 17; b. Newry, Ireland. With his parents he settled in Pennsylvania while yet a child. Waddel was educated in Nottingham, Penn.; was licensed to preach 1761; and removing to Virginia was pastor of Presbyterian churches 1762-75; and then became a planter in Louisa county, Virginia, and conducted a classical school, preaching on occasion. Two years later he became blind, but continued and even multiplied his labors. His fame as a preacher was great and widespread, as appears from William Wirt's sketch of the man and his manner in *The British Spy*. Pres. Madison declared that Waddel 'spoiled him for other preaching.' Patrick Henry named him as one of the two greatest orators he had ever heard.

WADDELL', JAMES IREDELL: naval officer: 1824-86, Mar. 15; b. Pittsboro, N. C. He entered the U. S. navy as midshipman 1841. While on the China station 1861 he resigned his commission as lieut., and on arrival in New York 1862, Jan., refused the command of a bomb-fleet destined for the attack of New Orleans. Waddell then made his way across the military cordon to Richmond, and was commissioned lieut. in the Confederate navy. He commanded the Confederate ram *Louisiana* at New Orleans, and under orders blew the vessel up after Farragut had dispersed the Confederate fleet. He was ordered to the Confederate cruiser *Shenandoah*, fitting out at Liverpool, and sailed as her commander 1864, Oct. 5; and preyed on U. S. vessels in the s. and n. Pacific, sinking and burning them till 1865, Aug. 2, when he first received intelligence of the surrender of Gen. Lee three months previous. The *Shenandoah* captured 38 vessels, of which she destroyed 32, many of them whaling-ships.

WADDING, *wâd'dĭng*, LUKE: annalist: 1588, Oct. 16—1657, Nov. 18; b. Waterford, Ireland. He studied some time in the Jesuit college in Lisbon, Portugal; then

entered the order of Franciscans 1605. Soon after his ordination as priest he became prof. of theol. at Salamanca; 1618 accompanied the bp. of Cartagena to Rome, on a mission to determine the controversy regarding the immaculate conception of the Virgin Mary, and wrote a history of the negotiations. He was procurator-general of his order at Rome 1630-34, vice-commissary 1645-48; founded the College of St. Isidore at Rome, for education of Irish Franciscans, 1625. He was one of the consulters in the case of Jansenius, and favored the Jansenist opinions at first, but retracted when they were condemned by the pope. He pub. (1647-54) 8 folio vols. of *Annales Ordinis Minorum.* He was also author of *Scriptores Ordinis Minorum,* and edited (in 12 folio vols.) the writings of Duns Scotus.

WADDINGTON, *wŏd'dĭng-ton,* WILLIAM HENRY: 1826, Dec. 11—1894, Jan. 13: statesman: b. Paris, of English parents, naturalized in France. He was educated in the Lycée St. Louis, Paris; and at Rugby School and Cambridge Univ., England; graduating at Cambridge 1849. Returning to France, he applied himself first to antiquarian studies, and traveled widely in pursuit of memorials of antiquity in Syria, Cyprus, Asia Minor, Germany, and England. He became a member of the national assembly for the dept. of Aisne 1871, and joined the left centre. He was minister of public instruction for a few days 1873, but went out of office with Thiers; was senator for the dept. of Aisne 1876-85, and then was re-elected for a term of 9 years; was again minister of public instruction 1876-7; then, 1877, Dec., minister of foreign affairs; represented France in the Congress of Berlin 1878; resigned from the foreign office 1879, Dec.; became ambassador to the Eng. court 1883, July; and held the office till 1893. He has published *Voyage en Asie Mineure; L'Edit de Dioclétien; Fastes des Provinces Asiatiques de l'Empire Romain;* and a continuation of Lebas's *Voyage Archéologique en Grèce et en Asie Mineure.*

WADDLE, v. *wŏd'dl* [a frequentative of WADE]: to hove from side to side in walking, as a duck or a very fat person. WAD'DLING, imp. *-dlĭng.* WAD'DLINGLY, ad. *-lĭ.* WAD'DLED, pp. *wŏd'dld.* WAD'DLER, n. *-dlẽr,* one who waddles.

WADE, v. *wād* [AS. *wadan,* to wade, to trudge: Dut. *waden;* Dan. *vade;* Icel. *vada,* to wade: Ger. *wat,* a ford: allied to L. *vadum,* a ford, a shallow; *vaděrĕ,* to go]: to walk or pass through water, deep mud, or any substance which impedes free motion; to accomplish with difficulty or labor. WA'DING, imp. WA'DED, pp. WA'DER, n. *-dẽr,* one who wades; one of the Grallæ (q.v.) or wading birds.

WADE, *wād,* BENJAMIN FRANKLIN: U. S. senator: 1800, Oct. 27—1878, Mar. 2; b. Feeding Hills, near Springfield, Mass.; son of James Wade, revolutionary

soldier; descendant of a colonist who came from England 1632. Wade settled with his parents in Andover, O., 1821; was school-teacher in Albany, N. Y., 1823-25, at the same time studying medicine; then returning to his home, he studied law and began practice in Jefferson, O., 1827. He was prosecuting atty. of Ashtabula county 1835-37; member of the Ohio senate 1837-39. His opposition to the surrender to the state of Kentucky of certain fugitive slaves, worked his defeat as a candidate for re-election; but he was successful 1841. He was elected judge 1847; and 1851, Mar. 15, was chosen U. S. senator, and was member of the senate continuously till 1869. From the first he was a prominent leader of the small band of anti-slavery men in the senate. Wade advocated the Homestead Bill and the repeal of the Fugitive Slave Act; he resolutely opposed the admission of Kansas under the Lecompton constitution, and the purchase of Cuba. After Preston Smith Brooks's assault on Charles Sumner, 1856, May 20, and Robert Toombs's expressed approval of the act, Wade in a fiery speech challenged every pro-slavery senator in the chamber to combat: the gage was not taken up. Then Wade formed a compact with Senators Simon Cameron and Zachariah Chandler to challenge any southerner who should insult them. During the civil war Wade advocated every measure that tended to weaken the enemy and to strengthen the Federal arms, as the bills for confiscation of all property of rebels in arms, abolition of slavery, etc. He was the chief leader of the republican senators in the impeachment of President Andrew Johnson. Wade severely censured President Hayes's moderate course in dealing with the southern states. He served on the San Domingo commission of 1871. He was a man of independent thought, positive convictions, dauntless courage and forcible expression. See *Life of Benjamin Franklin Wade,* by Albert G. Riddle (1888).

WADELAI, Central Africa: a military post in the equatorial province of the Egyptian Sudan, on the Nile not far below the Albert Nyanza. It is famous as the chief station of Emin Pasha, governor of the province, who, after the Mahdist rising, was cut off from civilization, and who was relieved by Stanley.

WADESBORO, N. C.: town, county-seat of Anson county; on the Seaboard Air Line and the Atlantic Coast Line railroads; about 120 m. s.w. of Raleigh and 50 m. s.e. of Charlotte. It is in an agricultural region in which the chief products are cotton and tobacco. The principal buildings are the county court-house, the Anson School Institute, opened in 1854, and the churches and schools for both races. The two banks, one national and one state, had (1903) a combined capital of $75,000. The national bank had deposits amounting to $180,000.—Pop. (1890) 1,198; (1900) 1,546; (1910) 2,376.

WADHAM COLLEGE: Oxford University, England, was founded in 1610 by Dorothy, widow of Nicholas Wadham, of Mayfield, Somersetshire, England, for a warden, 15 fellows, 15 scholars, two chaplains, and two clerks. One of the fellowships was diverted in 1857 to the endowment of the chair of experimental philosophy. The scholarships have an annual value of $400, and are tenable for five years; and there are besides 10 Hody exhibitions (six Greek, four Hebrew) of $250, two Wright exhibitions (1874) for scholars of Manchester grammar school, etc.

WADI, or WADY: (Arabian, 'ravine') in Palestine and Arabia, either a river or river valley, or the basin of a torrent.

WAD'LEIGH, George Henry: American naval officer: b. New Hampshire, 1842, Sept. 28. He was graduated from the United States Naval Academy in 1863 and was assigned to blockade duty with the West Gulf Squadron, serving until the close of the war. He was commissioned master in 1865, commander in 1880, served on the Arctic expedition in search of the Jeannette in 1881, was promoted captain in 1894, and in 1895-7 was in command of the Minneapolis on the coast of Asia Minor, engaged in the protection of American missionaries. He commanded the flag-ship Philadelphia in the Pacific station during the Spanish war, and after the conclusion of peace was in command of the Wabash at the Boston navy-yard. In 1902 he was promoted rear-admiral and retired.

WAD'LIN, Horace Greely, litt.d.: American statistician: b. Wakefield, Mass., 1851, Oct. 2. He studied architecture in Salem and in Boston, Mass., and in 1875-9 was engaged in the practice of that profession in the latter city. He was appointed special agent for the Massachusetts Bureau of Statistics of Labor in 1879 and upon becoming its chief in 1888 abandoned his professional practice. He resigned this position in 1903 to accept the post of librarian at the Boston Public Library, which he has since occupied. He was a member of the Massachusetts legislature in 1884-8, was supervisor of the United States census in 1890 and in 1900, and also of the Massachusetts census in 1895. He has published: *Reports on Statistics of Labor of Massachusetts* (14 vols., 1888-1901); *Annual Statistics of Manufactures of Massachusetts* (16 vols., 1888-1901); *Decennial Census of Massachusetts* (7 vols., 1895); etc.

WADSWORTH, Ohio: village in Medina co.; on the New York, Pennsylvania & Ohio Railroad; about 30 m. s. of Cleveland and 15 m. w. of Akron. It was settled in 1816, and in 1865 was incorporated. It is in an agricultural region in which tobacco is one of the important vegetable products. In the vicinity are large beds of coal, valuable sandstone quarries, and extensive deposits of fireclay. There are also deposits of clay and ochre.

The chief manufactures are door and window screens, wagons and carriages, steam injectors, flour, and machine shop products. There are eight churches, a normal school, graded public schools, and a library. There are two national banks which, in 1903, had a combined capital of $75,000 and deposits amounting to $396,020.—Pop. (1890) 1,574; (1900) 1,764; (1910) 3,073.

WADSWORTH, *wâdz'wėrth*, JAMES: soldier: 1730, July 6—1817, Sept. 22; b. Durham, Conn. He graduated at Yale 1748. He was brig.gen. of Conn. militia 1776; was commissioned maj.gen. 1777, and ordered to New Haven, there to organize the defense of the coast towns. He was later chosen judge of the common pleas of New Haven co.; was delegate to the continental congress 1783-86; and member of the executive council 1785-90.

WADS'WORTH, JAMES: educator: 1768, Apr. 25—1844, June 8; b. Durham, Conn. He graduated at Yale 1787. In 1790, in company with his brother William, he removed to the Genesee valley, western New York, and through the rise in value of land, large quantities of which they had purchased, he became one of the richest landholders in the state. He gave much effort and much money to advance popular education, publishing and circulating, at his own expense, works on this subject, and employing lecturers to speak on it. As early as 1811 he recommended the establishing of normal schools, and 1838 procured the enactment of the N. Y. School Library Law. He founded and liberally endowed a library and scientific institution at Geneseo. In selling his land he always stipulated that two tracts of 125 acres each, in every township, should be given, one for the support of a school and the other for a church. He died at Geneseo.

WADS'WORTH, JAMES SAMUEL: soldier: 1807, Oct. 30—1864, May 8; b. Geneseo, N. Y. He was educated at Harvard and at Yale; studied law in Albany, and was admitted to the bar 1833, but never practiced the profession, occupying himself with the management of his patrimonial estate of 15,000 acres in w. N. Y. He adhered to the free-soil faction of the democratic party 1848, and joined the republican party soon after its formation. In the first Bull Run battle he was volunteer aide to Gen. Irvin McDowell; was commissioned brigadier general volunteers 1861, Aug. 9; became military governor of the District of Columbia 1862, Mar. 15; in. December took command of a division in the Army of the Potomac under Gen. Burnside, and had part in the battle of Fredericksburg; at Gettysburg, 1863, July 1, his division was the first in action and was reduced from 4,000 to 1,600 men. During the succeeding two days Wadsworth held the heights on the right of the Union line; after the victory his voice in the council of war was for a vigorous pursuit of the defeated Confederate army. He was assigned to command the 4th division of the 5th

corps of the reorganized Army of the Potomac 1864, and while rallying his troops in the battle of the Wilderness received a bullet in the head 1864, May 6, and died 2 days afterward. He was brevetted major general of volunteers on the day of the action in which he was wounded. His services and sacrifices were great and memorable.

WADS'WORTH, PELEG: revolutionary soldier: 1748-1829, Nov. 18; b. Hiram, Oxford co., Me. Having graduated at Harvard, he was first a schoolmaster, then a merchant. At the outbreak of the revolutionary war he was made captain of a company of minute-men. He was later appointed adjutant general for Massachusetts; was present in the battle of Long Island; was commissioned brigadier general of militia 1777; was second in command in the Penobscot expedition 1779, and was taken prisoner; after release he was again captured in his house by British soldiers and held prisoner at Castine, Me., 1781, Feb.—June, when he escaped. He was elected member of the state senate of Maine 1792, and representative in congress 1793-1807. Congress granted him a large tract of land in Oxford county, Maine, in recognition of his military services; he settled on this land after retiring from congress, and greatly developed its resources.

WAFER, n. *wā'fėr* [OF. *waufre;* F. *gaufre;* Dut. *wafel,* a thin cake made by baking it between the round flat cheeks of a peculiar pair of tongs: Ger. *waffel,* a wafer; *wabe,* a honeycomb]: small, thin, round, dry piece of colored paste (made of flour, water, gum, and some non-poisonous coloring matter) used for sealing letters, documents, etc.—now largely superseded by the use of gummed envelopes; the small round piece of unleavened bread or paste used in the Rom. Cath. Chh. in the celebration of the Eucharist: V. to seal or close with a wafer. WA'FERING, imp. WA'FERED, pp. *-fėrd.* WA'FERER, n. *-ėr,* in *OE.,* a vender of wafers. WAFFLE, n. *wŏf'fl,* a thin batter-cake baked in waffle-irons and served hot.—The *Wafers* used in the Rom. Cath. Church are of different sizes, the smallest about an inch in diameter for the communion of the people, a second considerably larger for the celebration of the mass, a third still larger to be placed in the Monstrance (q.v.) for the service of benediction or exposition. See LORD'S SUPPER. In ancient times the bread and wine for the Eucharist were contributed by the faithful; and a place is found in the eucharistic service of every known liturgy for this offering, still known by the name Offertory (q.v.). But in the Latin Church, the bread (which, as being unleavened, and different from that in common use, needed special preparation) has been provided for many centuries by the clergy; and the practice has been followed of preparing it in the form of thin cakes, commonly, though not necessarily circular, and frequently impressed with

sacred representations or emblems, as the Crucifixion, the Lamb, the Christian monogram, the Cross, and other sacred symbols. The circular form itself is by some ritualistic writers regarded as symbolical, the circle being a figure of perfection.

WAFT, v. *wâft* [Scot. *waif, waff,* to blow: Dan. *vift,* a puff of wind: Sw. *vefta,* to waft, to winnow (see also WAVE)]: to convey or transport through a fluid medium, as air; to float, as on the water or through the air; in *OE.,* to beckon; to inform by a sign; to cast lightly or gently: N. a signal made by moving something, as a flag, in the air; a slight breeze. WAFT'ING, imp.: N. a bearing or floating, as on water or through air. WAFT'ED, pp. WAFTAGE, n. *wâft'āj,* in *OE.,* carriage by water or air. WAFT'ER, n. *-ėr,* one who or that which wafts or conveys. WAFTURE, n. *wâft'ūr,* in *OE.,* the act of waving.

WAG, v. *wăg* [Dut. *waggelen,* to stagger, to totter: Sw. *vagga,* to rock; Ger. *wackeln,* to wag, to totter: AS. *wagian,* to rock, to move]: to shake lightly; to move to and fro, as the head in fun or mockery; to move with quick turns from side to side; to stir; to move on; to depart; to be off. WAG'GING, imp.: N. the act of one who or that which wags. WAGGED, pp. *wăgd.*

WAG, n. *wăg* [probably from *wagging* the head as a sign of derision, or a contraction of *waghalter,* one fit to *wag* in a halter: comp. W. *gwag,* void, empty]: a joker; one who plays tricks; a man full of sport and humor. WAG'GERY, n. *-gėr-ĭ,* mischievous merriment; pleasantry; jocularity. WAG'GISH, a. *-gĭsh,* mischievous in sport; done in sport; full of sport and humor; frolicsome. WAG'GISHLY, ad. *-lĭ.* WAG'GISHNESS, n. *-nĕs,* the state or quality of being waggish; mischievous sport.

WAGE, v. *wāj* [OF. *wage,* a pledge or guarantee—from mid. L. *vadĭum*—from L. *vas* or *vadem,* a surety; *Goth. wadi;* OHG. *wetti,* a pledge, a security: It. *gaggio;* F. *gage,* a surety]: to make or carry on, as war; in *OE.,* to attempt; to venture; to wager; to throw down as a pledge: N. in *OE.,* a gage; a pledge. WAGING, imp. *wā'jĭng.* WAGED: pp. *wājd,* carried on, as war.

WAGER, n. *wā'jėr* [mid. L. *vadĭārĕ;* F. *gager,* to give pledges, to lay down stakes (see WAGE 1]: an unsettled question whose opposite alternatives are supported by two parties, who lay down stakes to abide the decision of the event; a subject on which bets are laid; a bet; formerly, trial by battle: V. to hazard on the issue of an event; to lay a pledge; to offer a wager; to bet (see BETTING). WA'GERING, imp.: N. laying of a wager. WA'GERED, pp. *-jėrd.* WA'GERER, n. *-jėr-ėr,* one who wagers or bets. WAGER OF BATTLE: see BATTEL, TRIAL BY WAGER POLICY, policy of insurance issued to a party that has no insurable interest. Such policy or wager is void at law.

WAGER OF LAW: an old form of giving securities, in an action of debt based on an unwritten contract that at some future time the party would wage his law—that is, put it to the oath of the defendant, who swore in presence of 11 compurgators as to the debt claimed. This action has long been abolished.

WAGES, n. plu. *wā'jĕz*, less frequently WAGE, n. *wāj* [F. *gages*, wages, money paid to a person as a pledge for his services (see WAGE, above)]: that which is paid at stated periods for labor or services rendered—usually restricted to daily, weekly, or fortnightly sums paid to laborers and mechanics: payment; recompense; reward. WAGE, v. in *OE.*, to take on hire; to hire for pay; to employ for wages. *Note.—Pay* is the general term for compensation for services rendered. *Fee* is the sum paid for some specific service, as to a physician, a lawyer, an official for registering documents, or the like. *Salary* and *stipend* imply more continuous (and usually, in some sense, official) service, compensation for which is usually reckoned at so much per annum—an editor's *salary*, the minister's *stipend*.—SYN. of 'wages': pay; fee; salary; stipend; hire; allowance; compensation; remuneration; fruit.—*Wages* are more absolutely ruled by their value in the market than other services. A writer of poems or a painter of pictures does work which is exceptional—if, because of his great ability or high repute, people are willing to pay him any price that he may ask for his work, there is probably no one who can compete with him and undersell him. A lawyer or a physician also may have special qualities to a great extent excluding competition; and in appointments to offices requiring trust, judgment, and skill, a great many things have to be considered besides the question, who will do the duty cheapest? But in the staple hand-works—the making of clothes or shoes, the baking of bread, the building of houses or ships, and the like—there are uniform functions of the hand which a certain number of persons will always be found ready to give for a price.

WAGGLE, v. *wăg'gl* [from WAG 1, which see]: to move one way and then the other; to reel; to move quickly from side to side, as a bird its tail; to wag. WAG'GLING, imp. *-glĭng*. WAGGLED, pp. *wăg'gld*.

WAGNER, CHARLES: French Protestant leader: b. Wilbersville, Alsace, 1852, Jan. 3. At the age of 14 he was sent to Paris to school; was graduated at the Sorbonne in 1869; and studied theology at Strasburg and Göttingen. He was the pastor of a small parish in the French province of Vosges until 1882, when he went to Paris, and there opened a Sunday-school, and later began preaching. The publication of his book *Jeunesse* (Youth) in 1891 marked him as a leader in the ethical movement in France, and his influence has since continually increased. Besides serving as pastor to a large congregation, he has taken an active part in many philanthropic

and charitable undertakings, and in this work comes into cordial relations with men of all shades of religious belief. His other publications translated into English include *The Soul of Things; By the Fireside; The Better Way; The Simple Life; On Life's Threshold* (1905). Of these *The Simple Life* has attracted particular interest in the United States and has been widely commended by religious and ethical leaders. In the fall of 1904, Pastor Wagner visited the United States, where he made numerous addresses.

WAGNER, *vâg'nėr*, Wilhelm Richard: German musical composer and dramatist: 1813, May 22—1883, Feb. 13; b. Leipzig. His father died 1813, his mother six years later. At the age of 11 years he attempted to write tragedies; in school showed no aptness for learning; and when 16 years old was permitted to apply himself to the study of music; yet the time that ought to have been given to his lessons Wagner spent in writing overtures, one of which was produced in the Leipzig theatre. He then attended lectures on philosophy and art, but without serious application to study. At last, tired of trifling and dissipation, he returned to the study of music, soon becoming proficient in counterpoint. His first essay in operatic composition, *Die Feen*, was refused by stage-managers, and Wagner, seeing that the public taste required works in the French or the Italian style, composed his *Rienzi*, in which the best characteristics of both are blended. He was director of the Magdeburg theatre 1834-36; and 1841 visited Paris to seek his fortune there; but though Meyerbeer befriended him heartily, Wagner could find no opening to fortune; and returning to Germany 1842, he succeeded in having the *Rienzi* accepted in Dresden, and it was there produced with complete success. The road to fortune now seemed open, and Wagner became a celebrity. He was appointed director of the Court Theatre, Dresden, and court chapelmaster. But his *Fliegende Holländer* (in his own characteristic style) which was given at the Dresden theatre (1843), did not suit the public taste. Nothing daunted, Wagner began the composition of *Tannhäuser* (produced 1845), in which he obeyed his own artistic inspiration; again the musical taste of the public condemned both the drama and the music. Wagner, confident that his ideas were essentially true, persevered in the face of determined opposition, producing *Lohengrin* (1850), the *Meistersinger* (1868); and later *Parsifal*. Wagner, not content with giving the highest artistic expression to his ideas in the dramas themselves, bestowed infinite care on the presentation of them, choosing always the best artists, and constantly revising text and instrumentation. —In the insurrectionary events of 1849 Wagner was in full sympathy with the revolutionists, and was active in the rising at Dresden. When order was restored, he fled to Zürich, where he at first turned to literature for a

livelihood, producing three books written in characteristic style and spirit: *Art and Revolution* (1849); *Art of the Future* (1850); *Opera and Drama* (1851). Wagner never recanted his revolutionary and democratic principles.—In 1855 Wagner was in London, director of the Philharmonic Society's concerts. In the meanwhile, Franz Liszt (q.v.) had produced Wagner's *Tannhäuser* at Weimar, and to the perfect satisfaction of Wagner, who witnessed the performance while on his way to Zürich. Liszt produced also *Lohengrin* (1850) with brilliant success, and encouraged Wagner to persevere. In his exile he became interested in the dramatic reproduction of the German mythology, and determined to complete the dramatization of the *Nibelungenlied.* As a sort of program of his proposed cycle he published 1853 his poetical work *Der Ring des Nibelungen.* Liszt was ever striving to obtain for Wagner opportunity to develop his genius and produce his works on the German stage; but the public was still largely indifferent, and Wagner, having completed *Rheingold, Walküre,* and the first two acts of *Siegfried,* rested at last discouraged. But this mood lasted only a short time; soon he produced *Tristan und Isolde,* in which he out Wagnered Wagner. First in 1864 was he enabled, by the magnificent generosity of the young Bavarian king Louis (who invited him to Munich), to follow freely the bent of his genius as composer and dramatist, and to put on the stage his works with such equipment, scenery, stage-machinery, etc., as he deemed indispensable for their competent presentation. The *Meistersinger,* thus produced at Munich 1868, at once achieved brilliant success. Then, for the representation of the Nibelung cycle, the Wagner Union (Wagner unions had been formed in several towns) erected for him at Baireuth (q.v.), in n. Bavaria, a special grand opera-house, planned by the composer himself, to realize his peculiar ideas as to the essentials of a building for grand musical drama. Its foundation-stone was laid with great ceremony 1872, May, by Wagner, in the presence of a host of his admirers; and for its opening (1876) he prepared a great operatic tetralogy, *Der Ring des Nibelungen.* Its cost, far beyond the estimates, was defrayed by the king.—Wagner died at Venice; and was buried at Baireuth, in a tomb that he had constructed for himself in the garden of his home.

In all Wagner's operas, the words of the libretto, his own composition, are adapted to a declamatory style of recitative, relieved by harmonies and instrumentation in accordance with the spirit of the situation. They are often magnificent in spectacle, but are purposely deficient in what is commonly understood as melody. Wagner's position amounts to this, that the highest mission and true end and object of music are realized only when it is the exponent of poetry, and that instrumental music is practically dead. A specially magnificent representa-

tion of the *Ring des Nibelungen* (in its four parts, *Rheingold, Die Walküre, Siegfried, Götterdämmerung*) was given in London in 1882. *Parsifal*, his last great work, based on the legend of the Holy Grail, was completed at Palermo 1882, Jan. 13, and brought out with marked success at Baireuth in July. Wagner wrote numerous books, mostly on musical subjects and often highly polemical; in *Beethoven* (1870, transl. by Dannreuther 1880) he explains his relation to Schopenhauer's philosophy. In 1836 Wagner married an actress at Königsberg, Fräulein Wilhelmina Planer; but after 20 years separated from her, and subsequently married Cosima, daughter of Liszt and divorced wife of Hans von Bülow.—The letters of Wagner to Liszt and other friends are extremely valuable; full use is made of them in the most elaborate biography in the English language, by Finck (1893). Other biographic and critical books are by Julien (1886), Tappert (1883), Muncker (1891), Liszt, Wolzogen (1883), Pohl, Nohl, Porges, Hueffer, Chamberlain (1892), Nietzsche, Schuré, Kufferath, Oesterlein, Dannreuther (in Grove), Henderson (1901), Krehbiel (1891), Kobbé, Newman, Weissheimer; thematic guides by Wolzogen, Kobbé, Heintz, Freda Winworth.

WAGNER, Siegfried, German musical conductor, son of Richard Wagner: b. Lucerne, Switzerland, 1869, June 6. He was intended for an architect, but being bent on adopting the profession of his father, he left the Polytechnic school and studied music under Kniese and Humperdinck. He became a musical conductor in 1893, traveling in this capacity on the Continent and in England, and in 1896, and again in 1899, conducted the performances of *Der Ring des Nibelungen* at Baireuth. He is the composer of the operas *Der Bärenhäuser* to his own text (1899), and *Herzog Wildfang* (1901); and various orchestral pieces.

WAGON, or Waggon, n. *wag'gon* [AS. *wægn;* Dut. *wagen;* Dan. *vogn;* Icel. *vagn;* Ger. *wagen*, a wagon; allied to Skr. *vaha*, a car; L. *vchĕrĕ*, to carry]: a four-wheeled vehicle for carrying goods, etc.; an open truck used in the goods traffic of a railway; in *OE.*, a chariot. Wag'onage, the price of conveyance by wagons, especially on a railway; wagons collectively. Wag'oner, n. *-ėr*, one who conducts or drives a wagon; name applied to Charles's Wain. Wag'onette', n. *-ĕt'*, an open four-wheeled carriage.—*Wagons* vary in construction according to the traffic in which they are employed. Most wagons are set on springs. For facility in turning, the fore-wheels are often smaller than the hind ones; and in addition, the fore-axle of the lighter kinds of wagon is attached to the body of the wagon by a swivel-joint, the shafts or pole being in this case attached to the fore-axle; but diminution of the size of wheels has the disadvantage of greater friction. To control and subdue the

momentum of a heavily-loaded wagon descending a slope, it is necessary to employ a drag of some sort—whose rudest forms are a thick cylinder of tough wood inserted between two spokes of the wheel, which, being carried upward in the wheel's revolution, is 'jammed' against the under side of the wagon frame, and stops the wheel's rotation; and the *chain-drag*—merely a chain firmly fastened at one end to the wagon-frame between a fore and hind wheel, and furnished at the other end with a large hook, to hold the tire of the hind wheel, also the method of chaining the fore and hind wheels together was in use. The *Shoe* and *Brake* (q.v.) are now mostly employed. Among the many forms of wagon in common use are the brewer's *dray*, the *lorry* (in Great Britain), the agricultural *wain* (in Europe), the *truck*, the *van*, the *bullock-cart* (in South Africa); also the lighter kind of covered vans used by grocers and other tradesmen to deliver their wares.

WAGRAM, *vâ'grâm*, or DEUTSCH-WA'GRAM, *doytch-:* village of Lower Austria, on the left bank of the Russbach, 10 m. n.e.-by-e. from Vienna; the site of the great battle between the French and Austrians (1809, July 5, 6) which forced Austria to bow before Napoleon and submit to the onerous conditions of the fourth treaty of Vienna. After the capture of Vienna, Napoleon resolved to pass the Danube and complete the prostration of Austria's military strength by the destruction of her last army—that under the Archduke Charles; and with this view he called in the Italian army, under Eugène Beauharnais, and all his outlying corps, concentrating them in and about the island of Lobau; and after a few feints calculated to mislead the archduke, who, stationed on the n. bank, was vigilantly guarding the various crossings, succeeded in effecting a passage on the morning of 1809, July 5, from the island of Lobau to the n. bank, opposite Enzersdorf, landing 150,000 infantry, 30,000 cavalry, and 600 pieces of cannon before six in the morning. When the morning light showed the Austrians how they had been out-maneuvered, they retreated across the plain of the March-field to its n. extremity, and took up a formidable position at Wagram, and, being closely pursued, were, on the evening of July 5, attacked by a part of the French army. By the vigorous exertions of the archduke in person, the assailants—after a temporary success—were completely repulsed; and the Austrians, exulting in their second victory over Napoleon, waited in sanguine expectation the events of the next day. In the morning the archduke resolved to assume the offensive, and succeeded at first in defeating the French centre under Masséna, and in forcing their left into inextricable confusion, followed by total rout; but at the same time his own left was turned by Davout, and this success, followed by a successful attack of Macdonald on their centre, forced the Austrians to retreat, which they did in

the most orderly manner, carrying with them 5,000 prisoners, and leaving 25,000 dead or wounded on the field of battle—the French loss being about equal. This drawn battle (the archduke having, as Savary says, 'in reality no reason for retiring') had all the moral effects of a victory for the French; and was followed July 11 by the armistice of Znaim, which resulted in the fourth treaty of Vienna.

WAGTAIL, n. *wăg'tāl* [from *wag* and *tail*]: small bird of the genus *Motacilla* and family *Motacillidæ*, now generally regarded as a sub-family (*Motacillinæ*) of *Sylviadæ;* distinguished by a lengthened and slender bill, long and pointed wings, rather long and slightly curved claws, and a long narrow tail which the bird incessantly wags up and down with a jerking motion—hence the name 'wagtail.' The genus *Motacilla* of Linnæus included many *Sylviadæ* not of this group—e.g., the Redbreast, Nightingale, Black cap, and Blue-throated Warbler; but as now restricted birds of this genus have a slender, awl-shaped, straight bill; nostrils oval, on the sides of the bill near the base, partly covered by a naked membrane; wings of moderate size, the first quill-feather the longest, the second and third nearly as long as the first, the tertials very long; tarsus much longer than the middle toe; tail of 12 feathers, long, and nearly equal at the end.—The wagtails run with great celerity, and seek their food on the ground—the food chiefly insects and small seeds. They frequent the margins of rivers and lakes, inundated fields, and other moist grounds. They make their nests on the ground, among moist herbage, or in stony places. Their flight is rapid and undulatory. They are natives of temperate regions of the old world. No species is found in America, except as a rare straggler from the other hemisphere. A common British species is the Pied Wagtail (*M Yarrellii*), seven to eight inches in length with the long tail, and has prettily varied white and black plumage. The Pied Wagtail is incessantly in motion, jerking its tail, running quickly along the ground in quest of insects, and making short flights from place to place, chirping as it flies. It is often to be seen wading in shallow water, in pursuit of aquatic insects, also catching minnows when they approach the surface. This species was long confounded with the White Wagtail (*M. alba*) of the continent of Europe, common from Sweden to the Mediterranean, and in many parts of Asia. The Gray Wagtail (*M. boarula*) is bluish gray above, with the rump and lower parts yellow, a black patch on the throat in summer. It is abundant in Europe, and is commonly seen on pastures, often in close attendance on cattle or sheep—whence the French name *bergeronette*, given to this and other species of Wagtail of similar habits.—The Yellow Wagtail (*M. flava*) and the Green-headed Wagtail (*M. Rayi*) also Brit. species, of which the latter is the

more common, belong to a sub-genus, by some regarded as a distinct genus, *Budytes,* having the hind claw very long and sharp, and thus approaching in character to the Pipits (q.v.) or Titlarks.

WAHABIS, or WAHABEES, *wâ-hâ'bēz,* or WAHA'BITES, *-bīts:* recent Mohammedan sect, now dominant throughout the greater part of Arabia. The movement, introduced by Wahab, is a fanatical and uncompromising Mohammedan reform, seeking to purge away the innovations and corruptions introduced in the course of ages, and to bring back the doctrines and observances of Islam to the literal precepts of the Koran and of the Sunna (q.v.), or oral instructions of Mohammed himself. This purified faith the Wahabis consider it their duty to impose at the point of the sword—in this, too, following strictly the precepts and practice of Mohammed and the first caliphs.

The founder of the sect, Ibn-abd-ul-Waháb, was son of an Arab sheik or chief, and was born in Nejed or Nejd (the central highlands of Arabia), about the end of the 17th century; d. 1787. He is said to have visited various schools in the principal cities of the East, and to have lived some years in Damascus; and here he is represented as forming the resolution to restore in its primitive shape the ruined structure of Islam. It was a difficult task. Throughout the Mohammedan world the precepts of the Koran had fallen into abeyance, especially among the Turks; and religion was little else than a round of external ceremonies—prayers, ablutions, fastings, worshipping of the holy sheiks or saints at their tombs, and other superstitious innovations. In central and e. Arabia, where the faith of Mohammed had never taken deep root, matters were even worse. According to Palgrave, 'almost every trace of Islam had long since vanished from Nejed, where the worship of the Djann (genii), under the spreading foliage of large trees, or in the cavernous recesses of Djebel Toweyk, with the invocation of the dead and sacrifices at their tombs, was blended with remnants of old Sabæan superstition, not without positive traces of the doctrines of Moseylemah and Kermut. The Koran was unread, the five daily prayers forgotten, and no one cared where Mecca lay, east or west, north or south; tithes, ablutions, and pilgrimages were things unheard of. Central Arabia was at that time divided among a multitude of virtually independent chiefs. One of these, named Sa'u'd (or Saoo'd), a young man of ardent and capacious mind, who ruled the small territory around the stronghold of Deraijeh or Dureeyeh (in Nejed), was the first important convert made by Ibn-abd-ul-Wahab after his return home: this young prince was induced by the Wahabi (about 1746) to draw his sword as apostle militant of the new, or rather revived, Islam. One after another, he subdued his heretical neighbors, offering them the alternative of con-

version or extermination. His son and successor, pursuing the same policy, extended his sway till he was brought into hostile contact with the Turkish authorities of Bagdad, whence an unsuccessful expedition was sent 1797 against the Wahabis by way of Hasa. The Wahabis now grew bolder in their plundering excursions toward the Euphrates, and 1801 Sa'ud, son of Abd-ul-Aziz, led an army against the holy city of Meshed Hussein or Kerbela, took it, massacred the greater part of the inhabitants, destroyed the tomb of Hussein, grandson of Mohammed, and carried off the treasures. On this, a second Turkish army was sent from Bagdad against Nejed, but was routed, and the greater part slain. The Wahabis (1803) laid siege to Mecca, which, after a resistance of two or three months, surrendered at discretion. Not the slightest excess was committed, but the people had to become Wahabis—'that is, they were obliged to pray more punctually than usual, to lay aside and conceal their fine silk dresses, and to desist from smoking in public. Heaps of Persian pipes, collected from all the houses, were burned before Sa'ud's headquarters, and the sale of tobacco forbidden.'—Burckhardt. In 1804 the Wahabi forces took Medina, where they stripped the tomb of Mohammed of its accumulated treasures, and prohibited the approach to it of all but Wahabis, as they considered the reverence paid to it by the Turks and others as idolatrous. At Medina 'the Wahabis enforced with great strictness the regular observance of prayers. The names of all the adult male inhabitants were called over in the mosque after morning, midday, and evening prayers, and those who did not obey the call were punished.

In the end of 1803 Sa'ud II. (grandson of the first Wahabite prince), perhaps the ablest ruler and warrior of the dynasty, had come to power; and for several years he extended and consolidated his dominion. Plundering incursions were made to the very vicinity of Bagdad, Aleppo, and Damascus; while the Wahabi sheik of Asir (s. of Hejaz) imposed the new faith on a great part of Yemen. On the e., Sa'ud took the islands of Bahrein, annexed a part of the Persian coast on the e. side of the Gulf, and exacted tribute from the sultan of Oman. This brought him into conflict with Great Britain, which sent (1808) a force and severely chastised the Wahabi pirates that infested the commerce of the Persian Gulf. A revolt of several of the s. provinces of Nejed was speedily suppressed, and a terrible example was made of the province of Harik and the town of Hutah, the town being completely demolished, and its inhabitants (males reckoned at 10,000) butchered.

From 1802 the Wahabis had prevented the great pilgrim caravans from reaching Mecca, both because they held the observances of the Turk and Persian hajjis to be idolatrous, and because they were scandalized at the gross immorality and indecency openly practiced by these

pilgrims. This brought into the conflict the sultan of Constantinople, the acknowledged protector of Mohammedanism, who ordered the pasha of Egypt to retake the holy cities. Medina was taken by the Egyptian forces 1812, and Mecca in the following year; and in 1818 Ibrahim Pasha (q.v.) succeeded in penetrating into central Arabia, and decisively breaking the Wahabi force, and capturing their capital, Deraijeh, which was laid in ruins. For a time the Egyptians held the conquered territories; but, after successive insurrections and fierce conflicts, they gave up the struggle; and the Wahabi sway, under Abdallah II., became after 1850 more powerful and extensive than ever. In 1870 the Ottoman govt. sent a military force into the Persian Gulf, which occupied Hofhuf, cap. of Hasa, but was then unable to penetrate further into Nejed, the central region of the Wahabis; but later, about 1875, the power of the Wahabis was practically restricted to the neighborhood of the city El Riad.

According to Burckhardt, there is not a single new precept in the Wahabi code: the only difference between the sect and the orthodox Turks (improperly so termed) is, 'that the Wahabis rigidly follow the same laws which the others neglect or have ceased altogether to observe. To describe, therefore, the Wahabi religion, would be to recapitulate the Mussulman faith.' One peculiarity of the Wahabis is their zeal against gaudy dress—silk and gold ornaments—and tobacco. In their wars of conversion, 'No Smoking' has been a kind of battle-cry.—The recent traveller Palgrave, who came into more intimate contact with the Wahabis than Burckhardt, has a much less favorable opinion both of their doctrines and their practice. He describes their empire as 'a compact and well-organized government, where centralization is fully understood and effectually carried out, and whose mainsprings and connecting links are force and fanaticism. . . . Incapable of true internal progress, hostile to commerce, unfavorable to arts and even to agriculture, and in the highest degree intolerant and aggressive, it can neither better itself nor benefit others.' The order and calm which it sometimes spreads over the lands of its conquest, Palgrave describes as the peace wrought by desolation. 'Its weakest point lies in family rivalries and feuds of succession. . . . But so long as Wahabiism shall prevail in the centre and uplands of Arabia, small, indeed, are the hopes of civilization, advancement, and national prosperity for the Arab race.

About 1860 a sort of Mohammedan religious revival, promoted by Wahabite missionaries, began in n.e. India, and multitudes were converted to the tenets of the sect. The machinations of these sectaries have caused much uneasiness to the English rulers of India.

The following statistical table of the Wahabi empire was drawn up by Palgrave, mostly from the official registers at Riad; it shows the state of the empire as re-

gards pop. when the power of the Wahabis was at its height, 1860.

Provinces.	Towns or Villages.	Population.	Military Muster.
1. Aared	15	110,000	6,000
2. Yemamah	32	140,000	4,500
3. Harik	16	45,000	3,000
4. Aflaj	12	14,000	1,200
5. Wadi Dowasir	50	100,000	4,000
6. Seley'yel	14	30,000	1,400
7. Woshem	20	80,000	4,000
8. Sedeyr	25	14,000	5,200
9. Kasim	60	300,000	11,000
10. Hasa	50	160,000	7,000
11. Katif	22	100,000	....
Total	316	1,219,000	47,300

The Bedouin populations within the territories number more than 70,000. Many of the towns are large, and populous to a degree that the current notions of central Arabia would not lead us to expect. The following are among those of which Palgrave estimates the pop.: Eyún, 10,000; Bereydah, 25,000; Oneyzah, 30,000; Toweym, 12,000—15,000; Horeymelah, 10,000; Mejmaá, 10,000—12,000; Riad, the cap. (which Col. Pelly has ascertained to be in lat. 24° 38′ 34″, long. 46° 41′ 48″), has probably about 40,000; Kharfah, 8,000; Hofhuf (Al-Hufhuf), 24,000. Katif (Khutif) is the most direct port of the Wahabi dominions and the province of Hasa, in which it is situated, is the richest.

To the n. of Nejed is a region, once a kingdom in alliance with Feysul, later a province of the Wahabi empire, then semi-independent, and finally aggregated to the Ottoman empire about 1875. It is divided into 5 districts—Djebel Shomer, Djowf, Kheybar, Upper Kasim, Teymar: pop. about 275,000, of whom 165,000 are Bedouins: the chief town and former capital of the kingdom, Hayel, has pop. 22,000. The people for a time professed Wahabism under duress; but when by the interference of Egypt they were enabled to throw off the Wahabite yoke, they returned to unreformed Mohammedanism.

Karsten Niebuhr is the first European writer who mentions the Wahabi; Burckhardt, *Notes on the Bedouins and Wahabis* (1830), gives a sketch of the Wahabi doctrines and of their history down to 1815; Sir Harford Jones Brydges, resident at Bagdad, published a *Brief History of the Wahauby*. Later authorities are W. G. Palgrave, *Narrative of a Year's Journey through Central and Eastern Arabia* (1862-3); Lieut. Col. L. Pelly, *From Oman to Nedjid* (1868); Hunter, *Our Indian Mussulmans* (1871).

WAHABISM, or WAHABEEISM, n. *wa-hâ′bē-ĭsm* [Eng. *Wahabi, Wahabee*]: the doctrines, principles, and practices of the Wahabis (q.v.).

WAHOO. See ELM.

WAHOO, NEB.: city, county-seat of Saunders co.; on

Cottonwood creek, and on the Chicago, B. & Q. and the Fremont, E. & M. V. railways; about 45 m. w. of Omaha. It is in a fertile agricultural region in which the principal products are wheat and corn. The chief shipments are wheat, corn, and live-stock. There are 11 churches, a high school, elementary schools, and a public library. The Luther Academy, under the auspices of the Evangelical Lutheran Church, was chartered in 1883. The three banks, two national and one state, had, in 1903, a combined capital of $150,000 and deposits amounting to $545,960. Pop. 2,000.

WAHPETON: 'dwellers among deciduous trees:' a division of the Dakota confederacy of the Siouan stock of North American Indians. Like the other Dakota tribes they lived largely by hunting and were noted warriors. There are now 1,030 Sissetons, 'cut-heads,' and Wahpetons under the Devils Lake agency, North Dakota, and 1,950 Sissetons and Wahpetons under the Sisseton agency, South Dakota, but the numbers of the individual tribes are not known.

WAHPETON, N. D.: city, county-seat of Richland co.; at the confluence of the Red River of the North and the Sioux Wood river, and on the Great Northern, the Northern P., and the Chicago, M. & St. P. railways, opposite Breckenridge, Minn., and about 43 m. s. of Fargo. It was settled in 1872 by M. T. Rich; became a village in 1881; and in 1884 was chartered as a city. The chief industrial establishments are flax fibre works, flour mills, machine shops, wagon factory, and lumber mills. It has grain elevators and lumber yards. The principal buildings are the county court house, churches, and schools. There are eight churches. The educational institutions are the Red River Valley University, the State Academy of Science, the Lutheran Bible School, and public and parish schools. The three banks have a combined capital of $160,000. The government is vested in a mayor and a council of six members elected biennially. About one-half the population are Scandinavians, Germans and Bohemians combined, the rest are American-born. Pop. 2,300.

WAHSATCH Mountains: a range in Utah, the e. boundary of the Great Basin, extending from the n. boundary of the state s. nearly to the Colorado river. Several peaks are nearly 12,000 feet high; at the base and among the foot-hills are deep cañons. Silver in large quantities is found in these mountains. See also Rocky Mountains; Utah.

WAIF. See under Waive.

WAIL, v. *wāl* [Icel. *væla;* W. *wylo,* to weep, to lament, to wail: Gael. *guil,* to weep: Goth. *wai,* woe]: to cry out in sorrow; to express sorrow by a mournful crying; to lament; to bewail: N. loud and mournful weeping; audible sorrow. Wail'ing, imp. N. loud cries of sorrow; deep

lamentation. WAILED, pp. *wāld.* WAIL'INGLY, ad. *-lĭ.* WAIL'FUL, a. *-fûl,* sorrowful; mournful.

WAIN, n. *wān* [another spelling of WAGON, which see]: four-wheeled carriage or cart for conveyance of goods; a wagon. CHARLES'S WAIN [see CHARLES'S WAIN]: the constellation Ursa Major or the Plow, so called from its fancied resemblance to a wain. WAIN'-MAN, n. *-măn,* in *OE.,* the driver of a wain. WAIN'ROPE, n. *-rōp,* in *OE.,* a wagon or cart rope. WAIN'WRIGHT, n. *-rīt,* a maker or builder of wagons.

WAINSCOT, n. *wān'skŏt* [Dut. *wagen-schot;* Low Ger. *wagenschot,* the best oak-wood without knots: said to be a corruption of Dut. *wagen,* a wagon, and *schot,* a partition of boards—the primary meaning being, therefore, panelling used in building a coach, hence, generally, panelling for walls]: the panelled timber-work lining the walls of a room: such lining is very common in Elizabethan architecture: the name is frequently applied to the best kinds of oak-boards, from oak having been so much used for panelling: V. to line with panelled boards. WAIN'SCOTTING, imp.: N. the materials used for covering the walls of a room; act of lining a room with panelled boards. WAIN'SCOTTED, pp.

WAINWRIGHT, *wān'rīt,* JONATHAN MAYHEW, D.D., D.C.L: Prot. Episc. bp.: 1793, Feb. 24—1854, Sept. 21; b. Liverpool, England; of American parentage. He graduated at Harvard 1812; studied theology, and was ordained priest 1818; became asst. minister in Trinity parish, New York, 1819; and was rector of another parish in that city 1821-34; then became rector of a church in Boston; returned to New York 1837, and there ministered till he became provisional bp. of New York 1852. For many years before he was raised to the episcopate he was sec. to the board of bps. Dr. Wainwright helped. to establish the Univ. of New York. He was greatly esteemed for ability and fervor. He published several vols. of *Sermons; The Pathway and Abiding Places of Our Lord* (journal of a tour in Palestine); *The Land of Bondage* (journal of a tour in Egypt): *Book of Chants; Music of the Church; The Choir and Family Psalter.*

WAINWRIGHT, RICHARD, LL.D.: American naval officer: b. Washington, D. C., 1849, Dec. 17. He was graduated from the United States Naval Academy in 1868, was promoted lieutenant in 1873, lieutenant-commander in 1884, and was executive officer on board the battleship *Maine* at the time of her destruction in Havana Harbor in 1898. In the war which followed he was in command of the *Gloucester* and took part in the naval battle at Santiago 1898, July 3, in which he destroyed the Spanish torpedo boats *Furor* and *Pluton.* He was superintendent of the Naval Academy in 1900-2; in the command of the *Newark* 1902-4; was a member of the general board

1904-7; and in 1907 was appointed to the command of the *Louisiana.*

WAIST, n. *wāst* [W. *gwasg,* the waist, the place where the body is squeezed in—from *gwasgu,* to squeeze or press: also said to be derived from AS. *wæstm,* growth, as being the part of the body where a man's development is best seen]: the smaller part of the trunk of the body between ribs and hips: the middle part of a body; the middle part of a ship; the narrowest part of a violin and instruments of similar construction; something girding the waist; a garment covering the waist or trunk; a bodice; corsage; basque. WAIST'BAND, n. a sash or band round the waist; the upper part of trousers or the like which encompasses the waist. WAISTCOAT, n. *wāst'kōt,* or *wĕs'kōt,* a close-fitting under-coat without sleeves, covering the waist and reaching a little below it; a vest.

WAIT, v. *wāt* [OF. *waïter* and *gaiter,* to observe, to watch: OHG. *wahta;* Ger. *wacht,* a watch, guard: It. *guatare;* F. *guetter,* to observe, to watch: connected with WATCH and WAKE 2, which see]: to be on the look-out for; to expect; to remain until something happens or some one arrives; to remain quiet; to stay; not to depart; to attend; to lie in ambush; to serve or attend, as a servant at table; the time occupied in waiting, as a long *wait.* WAIT'ING, imp.: ADJ. denoting one who attends on a person: N. the act of staying in expectation; attendance. WAIT'INGLY, ad. *-lĭ.* WAIT'ED, pp. WAIT'ER, n. *-ėr,* a servant in attendance; a tray or salver. WAIT'RESS, n. *-rĕs,* female attendant—applied usually to a table attendant at inns, restaurants, etc. WAITS, n. plu. *wāts,* the musicians who perform late at night in the streets, about Christmas, and who visit residents during the day, asking for a Christmas or New-Year box (see below). WAITING-MAID or -WOMAN, a servant who attends on a lady in her chamber. IN WAIT, in ambush. IN WAITING, in attendance. TO WAIT ON or UPON, to attend, as a servant; to go to see; to visit; to attend to; to follow, as a consequence. WAITER ON PROVIDENCE, a time-server.

WAITE, *wāt,* HENRY RANDALL, PH.D.: editor and clergyman: b. Copenhagen, N. Y., 1845, Dec. 16. He graduated at Hamilton 1868, then was engaged in journalism till 1870; studied theol. in the Union Theological Seminary, New York, and 1871-74 was pastor of the American church in Rome; was editor of the *International Review* 1876-7, and in the meantime and till 1880 pastor of a Presbyterian church in Pelham, N. Y. In 1891 he became acting pastor of a Congregational church in Brooklyn. Waite was president of the Political Science Assoc. of New York 1876-7; special officer of the U. S. census 1880-83; editor of the Boston *Citizen* 1885-6; then editor of *Civics* in New York. He has published *The Motive of St. Paul's Life; Illiteracy and the Mormon Problem.*

WAITE, Morrison Remick, ll.d.: jurist: 1816, Nov. 29—1888, Mar. 23; b. Lyme, Conn.; son of Henry Matson Waite, chief-justice of Conn., and descendant of Thomas Waite, emigrant to Mass. about 1663, who is reputed to have been son of that Thomas Waite, judge, who signed the death-warrant of King Charles I. Waite graduated at Yale 1837; was admitted to the bar and began practice in Maumee City, O., 1839; was member of the state legislature 1849; settled in Toledo, O., 1850, and there practiced law, holding eminent rank in his profession. He was of counsel to the United States before the international arbitration commission at Geneva 1871-2, his associate counsel being Caleb Cushing and William M. Evarts. He formulated with convincing force the case of the United States with regard to the supplies furnished to Confederate cruisers in British ports. He was elected by both the chief political parties to the Ohio constitutional convention 1874, and was unanimously chosen its pres. He succeeded Sampel P. Chase as chief-justice of the United States supreme court 1874. While he was on the bench, many very grave questions of constitutional law came up for determination—in particular, the authoritative interpretation of the latest three amendments to the constitution: the powers of congress, the rights of states, the privileges of citizens, were concerned. Waite's freedom from the bias of political partizanship was manifest in his judicial decisions on these and other questions. He refused emphatically, 1876, to be a candidate for the presidency of the United States; he also declined to serve on the mixed Electoral Commission (q.v.) of supreme court justices, senators, and representatives, created for the purpose of determining the conflicting claims of Hayes and Tilden to the presidency.

WAITS, *wāts* (formerly erroneously spelled *Waightes*): originally watchmen who announced the hours of the night by sounding a horn. In England in the time of Edward IV. the waits appear to have formed a distinct class from both the watch and the minstrels. It was their duty, we learn, from Rymer's *Fœdera*, to pipe the watch nightly in the king's court from Michaelmas to Shrove-Thursday four times, in the summer nights three times, and to make 'the bon gayte' at every chamber-door and office, for fear of pyckeres and pillers. The waits were not confined to the court: there were musical watchmen at an early period in many provincial towns. In Exeter a regular company existed in 1400. Beaumont and Fletcher (*Knights of the Burning Pestle*) speak of the 'waits of Southwark as rare fellows, as any in England.' The word in the provinces was afterward applied sometimes to the town musicians, who may have represented the old waits, but who had no duties as watchmen. The name was given also to the town band or to private musicians when employed as serenaders. In this sense it is used in the *Tatler* (No. 222): the writer says that it

had become so much the custom in Nottingham for lovers to employ the waits to assist them in their courtship that the ladies of that place could get no sleep. Till a comparatively recent time, waits were officially recognized in London and Westminster. In London the post of leader of the waits was purchased; in Westminster, the appointment was in the gift of the high constable and court of burgesses. At present, in London, the waits are musicians who play during the night or early in the morning for two or three weeks before Christmas; calling afterward at the houses of the inhabitants to ask for a Christmas-box. In Glasgow, Scotland, the magistrates still grant certificates to a few musicians, generally blind men, who play in the streets night and morning for about three weeks previous to New-Year's Day: like the London waits, they call at the houses of the inhabitants, show their credentials, and ask a small subscription.—See Chambers's *Book of Days,* II. 742.

WAIVE, v. *wāv* [mid. L. *wavĭārĕ,* to abandon; *wayvium,* a waif, Latinized from OF. *guesver,* to waive; *wayve,* anything wandering at large without an owner: Scot, *waif,* to blow: Icel. *veifa,* to vibrate (and see WAFT)]: to relinquish, not to insist on or claim; to defer for the present; to give up claim to; in *law,* to abandon; to cast off: N. in *OE.,* a waif. WAIV'ING, imp. WAIVED, pp. *wāvd.* WAIV'ER, n. *-ėr,* one who does not insist on some right or claim; in *law,* relinquishment of a right, or refusal to accept it. In law practice, the party that at proper time neglects to take advantage by his rights makes waiver. WAIF, n. *wāf,* anything drifted in by the ocean; a thing tossed abroad and abandoned; anything wandering at large without an owner; a thing found, but claimed by nobody; stolen goods thrown away by a thief when pursued; a worthless wanderer; a castaway. WAIFS AND STRAYS, the unsettled, wandering, and worthless members of society.

WAIWODE, n. *wā'wōd:* a variant of VAIVODE.

WAKASHAN (*wâ'ka-shăn*) INDIANS [from *Waukash,* the Nootka word 'good,' which when heard by Capt. Cook, was supposed to be the tribal name]: a linguistic stock of North American Indians, consisting of the Aht and Healtzuk divisions with their numerous tribes, occupying the northern half and the western part of the southern half of Vancouver Island, the opposite mainland of British Columbia, and a small area about Cape Flattery inhabited by the Makah, one of the Aht tribes. The stock has also been referred to as Nootka and Nootka-Columbian, the term Nootka being the first name applied to the Mowachat, an Aht tribe. Of the Aht division there are some twenty tribes, numbering in all about 3,100 individuals, of whom there are 414 Makah under the Neah Bay agency, Washington, the remaining tribes being under the West Coast agency of British Columbia.

The 17 Haeltzuk tribes number in all about 2,500 souls, of whom about 1,900 are under the Kwawkeweth agency, British Columbia.

WAKATIPU, *wâ-ka-tē′pô:* New Zealand, a picturesque lake in the South Island with an area of 112 acres. Queenstown and Glenorchy, on the borders of the lake, are favorite tourist resorts, on account of the magnificent mountain scenery in the vicinity.

WAKAYAMA, *wâ′kâ-yâ′mâ:* Japan, a town on the island of Hondo, situated on the e. coast of the channel leading into the e. end of the Inland Sea, 35 m. by rail s.w. of Osaka. It is an important centre of the cotton industry. Its noted features are the princely Kishu palace, and the beautiful temple of Kijmijdera said to have been founded in 770 A.D. Pop. 64,000.

WAKE, n. *wāk* [Icel. *vaka,* I open or cut into; *vök,* an opening cut in ice]: the track or streak of smooth water left by a ship or other body moving in the water.

WAKE, v. *wāk* [Icel *vaka;* Goth. *wakan;* Dut. *waken;* Sw. *vaka;* AS. *wacian;* Ger. *wachen,* to wake]: to be awake; to rouse or be roused from sleep; to watch; to refrain from sleeping; to be alive or active; to put in motion or action; to excite; to bring to life again; to watch or wait on a corpse till interment takes place: N. the sitting up all night with a deceased person—in some countries usually accompanied with drinking, etc.; in *eccles.,* a Vigil (q.v.); an annual festival in commemoration of the dedication of a parish church, formerly observed by watching all night and feasting (see below): in *OE.,* the state of being wakeful; a feast or merry-making. WA′KING, imp.: ADJ. not sleeping: N. act of rising from sleep; period of continuing awake. WAKED, pp. *wākt.* WAKEFUL, a. *wāk′fûl,* not sleeping, vigilant; stirring from sleep. WAKE′FULLY, ad. *-lĭ;* WAKE′FULNESS, n. *-nĕs,* want of sleep; forbearance from sleep. WAKEN, v. *wā′kn,* to cease to sleep; to rouse from sleep; in *OE.,* to produce; to excite. WA′KENING, imp.: N. the act of rousing from sleep. WA′KENED, pp. *-knd.* WA′KENER, n. *-kn-ėr,* or WA′KER, n. *-kėr,* one who wakens or arouses from sleep. WA′KER, n. *-kėr,* one who shares in a wake or death-watch. WAKE′ROBIN, n. *-rŏb′ĭn,* a monocotyledonous plant having acrid properties, the root of which yields a starchy matter; familiarly called Jack-in-the-box, from the peculiar arrangement of the parts of its flowers; the *Arum macŭlătum,* ord. *Arācĕœ,* also called cuckoo-pint (see ARUM).

WAKE, *wāk:* English equivalent of the ecclesiastical *Vigil* (q.v.). In early times the day was considered as beginning and ending at sunset; consequently Sundays and holidays began on the *eve* of the holiday or Sunday (i.e., on the evening previous); and worshippers then repaired to the churches. The following day was spent in amusement. Each church when consecrated was dedicated

to a saint, and on the anniversary of that day was kept the parish Wake. In many places there was a second Wake on the birthday of the saint. On these occasions the floor of the church was strewn with rushes and flowers, and the altar and pulpit were decked with boughs and leaves. In the churchyard, tents were erected to supply cakes and ale for the crowd on the morrow, which was kept as a holiday. The second part of the festival seems to have made most impression on the popular mind, and the word wake came to be applied to it. Crowds came from neighboring parishes, hawkers or merchants were attracted, and ultimately these wakes became mere fairs or markets, often disgraced by scenes of indulgence and riot. In 1285 Edward I. forbade fairs and markets to be held in country churchyards; and in 1448 Henry VI. ordained that all display of goods and merchandise, except necessary victuals, should be discontinued on the great festivals of the church. But the evil continued. An act of convocation passed 1536, during the reign of Henry VIII., seems to have effected a more important change. It ordered the day of the dedication of the church to be kept in all parishes on the Sunday first in Oct., and gradually that festival ceased to be observed. The saint's-day festivals were not, however, affected and they are still kept in many English parishes under the name of 'country wakes.'—A *lyke-wake* or liche wake is a watching of a dead body (AS. *lic*) all night by the friends and neighbors of the deceased. The custom—now confined principally to lower classes of Irish Rom. Catholics—no doubt originated in superstitious fear that the dead body might be interfered with or carried off by evil spirits.—See Brand's *Popular Antiquities,* by Ellis.

WAKE'FIELD: village and township in Middlesex co., Mass.; on the Boston and Maine railroad; 10 m. n. of Boston; formerly called South Reading. It contains 10 churches, public hall, 1 nat. and 1 sav. bank, high school, library, and 2 newspapers; is noted for its manufactures, which include rattan goods, boots and shoes, pianos, and stoves. It is a place of thriving business; and some of its churches have unusually fine buildings. Pop. (1900) 9,290; (1910) 11,404.

WAKE'FIELD: town and parliamentary borough of England, shire-town of the West Riding of Yorkshire; overlooking the Calder; 9 m. s. of Leeds, on the Lancashire and Yorkshire railway; 175½ m. from London. The town consists of three principal and many minor streets, and among the chief buildings are the parish church of All Saints, consecrated 1329, conspicuous from its lofty and elegant spire, rebuilt 1860-1; the grammar school, a wealthy institution, founded 1592, attached to which are six exhibitions to the universities; the library and news rooms, corn exchange, etc. Its benevolent and scientific institutions are numerous and important. The Calder is here spanned by a fine stone bridge of 8 arches, on which

stands the Chantry of St. Mary, endowed by Edward IV. in memory of his father Richard, Duke of York, who was killed at the battle of Wakefield 1460. It is a Gothic structure, 30 ft. long, 24 ft. wide. The town has long been famous for manufactures of woolen yarn and cloths. The district around is agricultural, and the town is noted for its grain and cattle markets. Coal mines are worked in the vicinity. Pop. (1901) 36,000.

WAKEFIELD, *wāk'fēld*, EDWARD GIBBON: social reformer and author: about 1796-1862, May 16; b. England. He was a land-surveyor, and, 1826, married at Gretna Green an heiress of 15 years, for which act he was imprisoned in Newgate, London, three years; the marriage was annulled by parliament. In prison, Wakefield studied prison management, and after his liberation pub., after most laborious research, a volume of pretended *Letters from Sydney,* which for a time passed as a record of actual facts in the penal establishments in Australia. He pub., 1831, *Tracts Relating to the Punishment of Death;* 1833, *England and America* (2 vols.), the fruit of very careful study; and the same year, *A View of the Art of Colonization.* By his writings and speeches he was instrumental in procuring the abolition of the penal transportation. He settled in New Zealand later, and was one of the founders of that flourishing colony. He introduced in New Zealand the 'Wakefield system' for the disposal of public lands, which consists in selling small lots at low prices to actual settlers, and using the proceeds as a fund for introduction of more settlers.

WAKEN. See under WAKE.

WAKE FOREST COLLEGE: located at Wake Forest, N. C., 16 m. n.e. of Raleigh. It was chartered in 1833 as the Wake Forest Institute, under the auspices and control of the Baptists of the state; it was first opened to students in 1834, and in 1838 the charter was amended, its privileges enlarged, and the name changed to Wake Forest College. The greater part of the endowment was lost during the civil war, but the college continued its work and regained its financial prosperity. The system of independent schools is now an established feature of the college organization; these schools are 15 in number, as follows: Latin, Greek, English, modern languages, mathematics, astronomy, chemistry, biology, physics, moral philosophy, history and political science, the Bible, pedagogy, law, and medicine. With the aim of encouraging ministerial education, it has been the custom of the college to organize a special class, studying different phases of pastoral work or theology; this is outside the regular work of the School of the Bible, and does not count toward a degree; a pastors' course of one month was inaugurated in 1902 for those pastors who could obtain a month's leave of absence from their churches. The

college has a pleasing location on high ground; its buildings include the main building, the Heck and Williams building (library), the Wingate Memorial building (chapel and audience hall), the Lea Laboratory (chemistry) and the gymnasium. The endowment in 1904 was over $200,000; the library contains 15,800 volumes, the students number 305, and the faculty 17.

WAKE ISLAND: an islet of rock in the Pacific Ocean, lying 1,550 m. n.e. of Guam, and 3,000 m. e. of the e. coast of Luzon, Philippines. It belongs to the United States as a Pacific outpost of the Philippine Archipelago. It is about 1 sq.m. in area, and its importance is due to the fact that it is on the cable route between the United States and the Philippines.

WAKE'MANITES: certain fanatics who were supposed to be harmless until they committed a murder at New Haven, Conn., in 1855. Their leader was an old woman named Rhoda Wakeman, supposed to have been insane. Her followers obeyed her as a prophetess and believed she had been raised from the dead. At her bidding they murdered a farmer, Justus Matthews, who, she said, was possessed by an evil spirit. The unfortunate man willingly submitted to the sentence pronounced by the old woman, but the authorities prevented further tragedies by taking prompt action against all concerned in the crime, and the sect became extinct.

WALA'CHIA. See ROUMANIA.

WALBRIDGE, *wawl'brĭj*, HIRAM: lawyer: 1821, Feb. 2—1870, Dec. 6; b. Ithaca, N. Y. In childhood he settled with his parents in O., there received his education, and was admitted to the practice of law 1842. While Texas was still an independent state, Walbridge emigrated thither with the purpose of establishing four newspapers in different quarters for advocacy of annexation to the United States; but before his plan could be executed, the state was annexed. He then returned to law practice in Toledo, O.; and removed to New York 1847. He represented a N. Y. dist. in congress 1853-55.

WALCHEREN, *vâl'cher-en:* island of the Netherlands, prov. of Zeeland; at the mouth of the Scheldt; 52,000 acres. The chief places are Middelburg, Flushing, and Vere or Campvere. One-half is meadow, the other rich arable land, well wooded to the north. Where it is not protected by natural downs, strong dikes have been formed, that at West Kappelle being a magnificent work. The drainage-water is carried off by large sea sluices at Middelburg and Vere. Agriculture is the principal employment. Shipbuilding, beer-brewing, rope-spinning, weaving, wood-sawing, tanning, etc., are carried on, especially at Middelburg and Flushing. From the latter town a railway has been constructed through West and South Beveland and Bergenop-Zoom, joining the other continental lines. Pop. of island 45,000.

WAL'CHEREN EXPEDITION: disastrous British military expedition, 1809, undertaken to help the continental allies of Great Britain in the operations against France, by creating such a diversion as would prevent the concentration of Napoleon's strength, in overwhelming amount, against any one of his opponents. The expedition was planned 1807, when Prussia, Russia, and Austria all were in arms against France; but it was not till early in the summer of 1809 (when Napoleon, who had overwhelmed Prussia, and reduced Russia to neutrality, was gradually forcing Austria to succumb) that the Brit. ministry resolved to carry it out. The plan was to send a fleet and army up the Scheldt (q.v.) and attack Antwerp (the principal naval station and arsenal for n. France), whose fortifications, though formidable, were out of repair, and whose garrison at the time numbered only about 2,000 invalids and coast-guards; while there were not more than 10,000 French soldiers in Holland. After many needless delays, the expedition sailed 1809, July 28; and, to the number of 37 men-of-war, 23 frigates, 115 sloops and gun-boats, accompanied by transports carrying about 41,000 soldiers, reached the Dutch coast on the following day. But, instead of obeying the orders of Lord Castlereagh, the minister of war, to *advance at once in force against Antwerp*, the commander-in-chief, Lord Chatham (elder brother of Pitt), frittered away his time in the reduction of Vlissingen (Flushing), which was not effected till Aug. 16, by which time the garrison of Antwerp had been reinforced by King Louis Bonaparte with the troops at his command (about 6,000), and by detachments sent from France, which swelled the garrison (Aug. 20) to 15,000 men. About the end of Aug., Chatham 'found himself prepared' to march on Antwerp; but by this time 30,000 men, under Bernadotte, were gathered to its defense, and the Brit. army was decimated by marsh-fever, so that success was not to be hoped for. However, it was judged desirable to hold Walcheren, in order to compel the French to keep a strong force in Belgium; accordingly, 15,000 men remained to garrison the island, the rest returning to England; but the malaria wrought fatal ravages; and as peace had been concluded between Austria and France, this force also was recalled. Thus an excellently devised scheme failed through the stupidity of the agent chosen to carry it out, and ended in a loss of 7,000 men dead, and permanent disablement of half the remainder.

WALCKENAER, *väl-kĕ-när'*, CHARLES ATHANASE, Baron, French savant and author: b. Paris, 1771, Dec. 25; d. there 1852, Apr. 27. At 17 he went to study at Glasgow and Oxford; served as director of transportation in the army of the Pyrénées in 1793; became mayor of Paris in 1816, and prefect of the department of Nièvre

in 1824 and of Aisne in 1826. In 1830 he finally left the public service, and in 1840 he became perpetual secretary to the Academy of Inscriptions. He was a voluminous writer on very many subjects. His first publication was an *Essai sur l'histoire de l'espèce humaine* (1798), and in 1802 he published an *Histoire abrégée des insectes des environs de Paris* and in 1805 a *Tableau des aranéides*, an important contribution to entomology. Among his remaining works may be cited: *Le monde maritime* (1819); *Nouvelle collection des relations des voyages* (21 vols., 1826-31); *Analyse géographique des itinéraries des anciens* (1839); *Histoire de la vie et des poésies d'Horace* (1840); *Mémoires sur Madame de Sévigné* (1842-52), which he left incomplete.

WALCOTT, *wŏl'kŏt*, Charles Doolittle, American geologist: b. New York Mills, N. Y., 1850, March 31. He made a special study of geology, and in 1876 became assistant State geologist of New York. He was appointed to a like office in the United States geological survey in 1879, became palæontologist in 1883, chief palæontologist in 1891 and in 1893 was appointed geologist in charge of geology and palæontology, assuming the office of director of the geological survey in 1894. He was acting assistant secretary of the Smithsonian Institution in 1897-8, and in 1902 was elected chairman of the board of trustees for the National University founded by Andrew Carnegie. He has made a specialty of Cambrian researches and in 1888 laid the results of his labors before the International Geological Congress in London. In addition to numerous reports his writings include: *The Trilobite* (1881); *The Cambrian Faunas of North America* (1885); *The Taeonic System of Emmons* (1888); *The Fauna of the Lower Cambrian or Olenellus Zone* (1890); *Correlation Papers, Cambrian* (1891); etc.

WALDECK, *väl'dĕk* or *wŏl'dĕk*, Germany, a principality consisting of two distinct portions, Waldeck proper and Pyrmont. Waldeck proper, with an area of 407 sq. m., is enclosed by the Prussian provinces of Westphalia and Hesse-Nassau; and Pyrmont, with an area of 25 sq. m., is enclosed by Prussia, Brunswick, and Lippe. Both sections are mountainous, and belong to the basin of the river Weser. Waldeck proper is nowhere much under 600 feet above sea-level, and in the western region, known as Upland, it attains in the Ettelsberg an elevation of 2,726 feet. Much of the soil is unsuited for agriculture, but some parts, such as the lower valley of the Eder and the northeast of Waldeck proper, are fairly fertile. The chief industries are agriculture and the rearing of cattle, sheep, pigs, and other animals. Manufactures are of small extent: the most important are tobacco and cigars (Pyrmont), liqueurs (Arolsen), and machines (Wetterburg). There are ironstone mines at

Adorf. The constitution bears date 1852, Aug. 17. The princely dignity is hereditary according to primogeniture in the male line, but on the extinction of the male line it falls to the female line. The Diet consists of 15 members elected indirectly for three years. By the Treaty of Accession of 1867, renewed in 1877 and 1887, the internal administration is carried on by a Landesdirektor appointed by the Prussian government with the approval of the prince. Its courts of justice are subject to those of Cassel and Hanover, and its troops form a battalion of a Prussian infantry regiment. Arolsen is the capital and residential town. The Reformation was introduced under Count Philip IV. in 1526. The imperial field-marshal, George Frederick (1664-92), was the first of its rulers to assume the style of prince. In 1712 the ruler Anton Ulrich was created a prince of the empire. Waldeck supported Prussia in the war of 1866, and entered the North German Confederation in the following year. The Treaty of Accession of 1867, which makes the prince a merely nominal sovereign, was the result of a desire expressed by the Diet for union with Prussia. Pop. (1900) 57,918, of whom 8,636 are in Pyrmont. The inhabitants are nearly all Lutherans.

WALDECK-ROUSSEAU, *väl-dĕk-roo-sō*, Pierre Marie, French statesman: b. Nantes, 1846, Dec. 2; d. Paris, 1904, Aug. 10. He studied law, was admitted to the bar at Nantes, was elected deputy for Rennes in 1879, and in 1881 was made minister of the interior in Gambetta's cabinet. This portfolio he held also with great success in the Ferry ministry of 1883-5, in 1886 was called to the Paris bar, and, though he continued to participate until 1889 in the debates of the Chamber of Deputies and in that year published a collection of *Discours Parlementaires*, he then withdrew temporarily from public life and became one of the foremost of French advocates. His best known case was the defense of De Lesseps in the Panama canal matter. In 1894 he returned to politics as senator for the department of the Loire, in 1895 was an unsuccessful candidate for the presidency, and in 1899 was summoned by Loubet to form a ministry. On the second attempt he succeeded in assembling in support of the Republic a cabinet including such diverse elements as Millerand, the Socialist, and General de Gallifet, who had so severely put down the Commune in 1871. He himself took again the ministry of the interior, and during the second Dreyfus trial, the strikes at Le Creusot, the prosecution and condemnation of Déroulède, and other troubles, he suppressed the disorder hitherto prevalent and enforced a regard for the law. The Associations bill of 1901, by which he asserted the religious associations were for the first time made subject to the rules governing others, was the principal event of the latter

part of his administration. At the general election of 1902, Republican victory was complete, and Waldeck-Rousseau, regarding his service as accomplished, resigned 1902, June 3. He had proved himself one of the strongest figures in recent French politics. He further published: *Discours Prononcés dans la Loire* (1896); *Questions Sociales* (1900); *Associations et Congrégations* (1901); *Le Défence Républicaine* (1902). Consult Ernest-Charles. *Waldeck-Rousseau* (1902).

WALDEMAR I., *väl'dĕ-mär* or *wŏl'dĕ-mar* (The Great), king of Denmark: b. 1131: d. 1181. He succeeded Eric V. in 1147, was famous for his expeditions against the pirates of the Baltic, and successful in exacting from Magnus VI., king of Norway, a treaty which secured the pre-eminence of Denmark. Waldemar II. (the Victorious), younger son of the preceding, succeeded his brother Canute VI., in 1202. He made warlike expeditions into Sweden, Norway, and Germany, raised a powerful navy, and revised the laws of his kingdom. He died in 1241. Waldemar III., eldest son of the preceding, was regent from 1219-31. Waldemar IV., third son of Christopher II., was in Bavaria at the death of his father in 1333. In 1340-4 he recovered part of his kingdom in war, and obtained some further successes against Sweden in 1353 and 1357; eventually, however, he was glad to obtain peace by large concessions.

WALDEN, *wawl'den*, John Morgan, d.d. ll.d.; Methodist Episc. bp.: b. Lebanon, O., 1831, Feb. 11. He graduated at the Farmers' (now Belmont) Coll., Cincinnati, O., 1852; was for two years a school teacher, then a journalist, and in 1857-8 edited and published a newspaper in Kan. He was elected to the Topeka legislature and to the Leavenworth constitutional convention (free-state), and 1858 was appointed supt. of public instruction; but the same year, returning to O., he became minister of the Meth. Episc. Chh. in the Cincinnati conference. He was corresponding sec. of the Meth. Episc. Freedmen's Aid Soc. 1866-68; then for 16 years was one of the publishing agents of the Western Book Concern. He was elected bp. 1884.

WALDEN, Treadwell, American Episcopal clergyman: b. Walden, N. Y., 1830, Apr. 25. He was graduated from the General Theological Seminary in 1853, took priest's orders in the Episcopal Church in 1856 and after holding charges in Newark N. J., was rector of Christ Church, Norwich, Conn., 1857-63; St. Clement's, Philadelphia, Pa., 1863-8; St. Paul's Cathedral, Indianapolis, 1869-72; St. Paul's, Boston, 1873-6, and St. Paul's, Minneapolis, 1882-5. He published: *Lays of a Lifetime* (1856); *The Sunday-school Prayer Book* (1860); *Privations and Sufferings of United States officers and Soldiers in Confederate Prisons* (1864); *Our English Bible and*

its Ancestors (1870); *An Undeveloped Chapter in the Life of Christ* (1882); *The Great Meaning of Metanoia* (1896).

WALDEN, N. Y., village in Orange co.; on the Walkill river, and on the New York Central & Hudson River railroad (Walkill Valley branch); 75 m. n. by w. of New York, and 13 m. n.w. of Newburgh. The date of the first settlement is uncertain, but it was before 1768; the village was incorporated in 1855. It was first known as High Falls, owing to the fall of 40 feet in the river at this point. It is in an agricultural region, noted for its dairy products and in a valley famous for its picturesque scenery. It has large cutlery works, woolen mills, a soap factory, engine works, foundries, and machine shops. There are two banks, one of which is a national bank. Pop. (1903) 3,147; (1910) 4,004.

WALDEN UNIVERSITY, an institution for the education of the colored race, located at Nashville, Tenn. It grew out of a school for adults and children established by the Freedmen's Aid Soc.; in 1866 it was chartered as Central Tennessee Coll. It is under the control of the Meth. Episc. Chh. In 1900 the name was changed to Walden University in honor of Bishop John M. Walden. The university includes the following departments: (1) Collegiate department; (2) academic department (preparatory; (5) law department; (6) Braden Bible Training School; (7) music department; (8) Meharry Medical College; (9) industrial department. The collegiate department offers two four years' courses, the classical and the scientific; and two corresponding preparatory courses of three years. The normal department offers a course five years in length (instead of four years, as formerly); the first three years are the same in rank as the college preparatory course; the completion of this course entitles the student to the degree of bachelor of pedagogy. The academic department offers a two years' English course, and a two years' teachers' preparatory course. In all these courses the daily study of the Bible is required. The law department, which was the first law school for colored students established in the South, has a two years' course. The Braden Bible Training School offers a theological course, correspondence courses in theology, and a missionary and deaconess training course. The theological course is two years in length, with a year of post-graduate work; the missionary training course includes studies in industrial department and the medical school. The Meharry Medical College was founded in 1876; it offers a four years' medical course, which may be completed in three years by those holding an A. B. or B. S. degree; the dental college, the pharmaceutical college, and the nurses' training school are also a part of the medical department. The industrial depart-

ment includes the trade schools, the school of domestic science and art, and the Walden Industrial School. The trade schools offer instruction and practice in carpentry, sloyd, painting, paper-hanging, calcimining, masonry and plastering, and landscape gardening for men, and in sloyd for women; the school of domestic science provides instruction in cooking, sewing, laundry work, etc., for women; the industrial school is for the industrial training of children, and serves also as a model school for the normal department. When the students attain sufficient proficiency in industrial classes, work is furnished them by which they may pay a portion of their expenses. The students maintain two literary societies. The university buildings (1904) on the campus include the administration building, seven other brick buildings, and seven wooden buildings; the medical college is located in another part of the city. The library in 1904 contained 2,500 volumes; students of the law department also have access to the State Law Library. The students in 1903 numbered 755, of whom 339 are in the medical department. Many of the graduates are teachers; and others are successful doctors and lawyers.

WALDENSES, n. plu. *wŏl-dĕn'sēz*, or VALDEN'SES, *văl-*, and VAUDOIS: Christian community inhabiting a mountain tract on the Italian side of the Cottian Alps, s.w. from Turin. The dist. is bounded n. by the Dora Ripaira, s. by the Po, and is inclosed on all sides by spurs of the Alps, which divide it into three valleys—Perosa, drained by the Clusone; San Martino, drained by the Germanasca; and Lucerna, drained by the Pelice, all tributaries of the Po. These valleys lie between France and Italy, immediately s. of the great w. route into Italy by the passes of Mont Cenis and Genèvre. The inhabitants are thus brought into communication with both countries; indeed, they speak a dialect more closely allied to the dialects of Dauphiné than to those of Piedmont; and they have used French as well as Italian as the language of their liturgy. The religious doctrines of the W. are now similar to those of the Reformed churches. There is a minister in each parish, called a *barbe*, and the synod is presided over by an elected *moderator*. The W. had at one time bishops, but that was when the sect was more widely spread than it now is. Much has been said of the origin of the W. Their own historians assert that the community has remained from apostolic times independent of the Church of Rome, and boast that they can show a regular apostolic succession of bishops from the earliest period of Christianity till that of the Reformation. Recent investigations, however, show this statement no longer tenable. Dieckhoff (*Die Waldenser im Mittelalter*, Gött. 1851) and Herzog (*Die romanischen Waldenser*, Halle 1853) have submitted the early history

of the W. to a critical examination; and the result to which they have come is, that the W. had not the early origin claimed for them, and were not Protestant before the Reformation, though they held some opinions which were in anticipation of those held by the Reformers. These scholars are also of the opinion that the W. do not take their name from *val, vallis*, a valley, as has been assumed, but from Peter Waldo, of Lyons, merchant of the 12th c., who was less the founder of a sect than the representative and leader of a widespread struggle against the corruptions of the clergy. The church would have tolerated Peter Waldo, as it had tolerated St. Francis of Assisi, founder of the Franciscans; and perhaps have allowed him to form a new order, had he not trenched upon ground dangerous to the hierarchy. He had the four gospels translated, and maintained that laymen had a right to read them to the people. His opinions were condemned by a general council 1179, and he retired to the valleys of the Cottian Alps. A long series of persecutions followed, but Waldo's followers could not be forced to abandon their opinions. They continued to be known as the *Leonisti*, from the place of their origin; the Poor People of Lyons, from their voluntary penury; *Sabotati*, from the wooden shoes they wore; and *Humilitati*, from their humility. It was natural that a body cruelly persecuted should stand aloof from the church, and even offer armed resistance, yet there is no record of the manner in which the W. first became a separate community. They are now shown to have been identical with the followers of Waldo; but they must not be confounded with the Albigenses (q.v.), who were persecuted at the same period. The protest of the W. against the Church of Rome related to practical questions only; that of the Albigenses related to matters of doctrine.

The W. seem to have spread at first in the upper valleys of Dauphiné and Piedmont, to which Waldo retired. They were subjected to persecutions 1332, 1400, and 1478, and driven into many parts of Europe, where their industry and integrity were universally remarked. So widely had the sect been scattered that it was said a traveller from Antwerp to Rome could sleep every night at the house of one of the brethren. In Bohemia, where many of them had settled, they, without forsaking their own community, joined the Hussites, Taborites, and Bohemian Brethren—a connection which led to a change in the principles of the Waldenses. They adopted the doctrines of the Reformers, and this led to more serious persecutions than they had previously undergone. Francis I. of France, in possession of Piedmont 1541, ordered them to be extirpated. They were massacred at various places in Dauphiné and in the valleys that they still occupy, especially at Merindol and Cabrière. Several persons

who refused to abandon their faith were burned alive, yet the sect continued to exist. In 1560, the Duke of Savoy, who had recovered possession of Piedmont, urged by Pope Paul IV., forbade the W. to exercise their faith, under the penalty of being sent to the galleys for life. The W. sent the duke a petition and apology for their creed, which appeared to him so plausible that he suggested that a conference should take place between the Waldensian and Romanist divines. He was, of course, told that the proposition was monstrous and, under effectual inducements by the pope and the courts of Spain and France, he dispatched 7,000 men into the valleys, who were joined by two French regiments. The W. offered a gallant resistance, but were overwhelmed by superior force. Many prisoners were burned alive, and women and children were slaughtered. The duke was disgusted with these atrocities, and, though denounced as no better than a heretic at Rome, granted the W. an amnesty on condition that their worship should be performed only at certain places in the valleys of Lucerna and San Martino. The W. in the other districts, especially in the marquisate of Saluzzo, were then persecuted by the Jesuits. Charles I. of England sent two embassies to the Duke of Savoy to intercede in their behalf, but without avail. Victor Amadeus I., not long after, ordered the W. of Saluzzo, under penalty of confiscation of property and death, to become Rom. Catholics; and the edict was so rigorously carried out that, in a few years, none of the sect remained in the district. Charles Emmanuel II. directed a fresh persecution against the W. 1655. Some time before, the people of Lucerna, inflamed, it is said, by the discourses of Jean Leger, a popular preacher, set fire to a convent of Capuchins, and committed other excesses. An inquiry was made, and it was found that the W. had purchased property and built churches and schools in districts where no concessions had been granted them. They were ordered within 20 days to sell their property or recant. They resisted, under leaders named Jayer and Janavel, but they could not successfully oppose the forces sent against them. No quarter was shown to women and children, and atrocities were committed—especially by the French and Irish mercenaries in the service of the duke—which, recorded by Jean Leger, aroused indignation in all Prot. countries. Subscriptions were made in England for those who had survived the massacre. The Swiss cantons and the states of Holland sent envoys to the duke. Cromwell—then a terror to ecclesiastical persecutors, Rom. Cath. or Prot. —called the Prot. powers to unite against such atrocities, and addressed to the duke stern remonstrances in Latin letters written by Milton (see his famous sonnet): and Sir Samuel Morland, sent by Cromwell to the scene of cruelty, collected and brought back to England numerous

manuscripts connected with the history of the W. The result was that a convention was concluded by which the W. were again allowed to exercise their worship. But, after some years, having no protector, they were again restricted as to worship; and in 1685 Louis XIV. revoked the Edict of Nantes, and ordered the Duke of Savoy to compel the W. to adopt the Rom. Cath. faith. They were accordingly commanded to emigrate or abjure their tenets within 15 days. They resisted, and were attacked by the troops of the duke on one side, and those of Louis XIV. on the other. They were overpowered, and the survivors could make no conditions. A large number were imprisoned at Turin, where many died: others were allowed to emigrate. Their whole property was confiscated, and handed over to Rom. Cath. colonists. When the Prince of Orange became King William III. of England (1688) the W. who had settled in Switzerland resolved to return to their valleys under the guidance of Henry Arnaud, one of their pastors. In 1689 they gathered from all quarters to the rendezvous in the great forest of the Pays de Vaud. On the night of Aug. 16 they embarked on the Lake of Geneva, landed on the opposite shore, and, after encountering determined opposition, reached the valley of San Martino, after a perilous march of 31 days. During the winter a French army of 22,000 men entered their territories, and in the following summer attacked their fortifications, but were repulsed with great slaughter. Fortunately the French and Piedmontese at this juncture quarrelled, and the Piedmontese, to secure the services of the mountaineers, granted them an amnesty. They are said to have fought not less than 18 battles against the French, and to have lost only 30 men. This was the last persecution against the Vaudois; but it was not till 1848 that they were put on a level with their Rom. Cath. fellow-subjects. They had then 18 pastors and 15 congregations: in 1879 there were 56 regular Waldensian congregations (with 14,600 communicants), besides 24 'missionary stations' in various parts of Italy, as at Turin and Rome. In 1883 there were 43 churches and 38 mission stations in all Italy, with 37 ordained pastors, 6 evangelists, 56 teachers, and about 14,000 communicants. About three-fourths of the revenue of the church is derived from contributions received from the churches of Great Britain and other Prot. countries. The *Libera Chiesa*, a Prot. Italian church, is not connected with the Church of the Valleys. The W. have a college at Florence, and publish several denominational and missionary journals.—See the works of Botta, Bender, Morland, Gelly, Muston.

WALDENSIAN, n. *wŏl-dĕn'shan:* one of the Waldenses (q.v.): Adj. of or pertaining to the Waldenses.

WALDENSTROM, *vâl'den-ström*, PETER, PH.D.: church reformer: b. Luleå, Sweden, 1838, July 20. Having passed the high school 1857, he studied theol., but meantime became prof. in a high school, which position he still (1892) holds. He was ordained minister of the Swedish Lutheran Chh. 1864, but never received a pastoral charge; he resigned his ministerial rank in the state chh. 1882, in order to be free to labor for the 'evangelical national institution,' a movement for the reform of religion in Sweden. W. had for years co-operated with the 'institution,' and had become one of its strongest leaders, zealously promoting evangelical reform by voice and pen. The movement has even been called by its Lutheran opponents 'Waldenströmism.' After the death of Rosenius, founder of the movement, W. became editor of the journal *Pietisten*, the organ of the evangelical institution, and still edits it. Later the movement took the name *Svenska Missions Förbundet* (Swedish Mission Union); in its strong reaction from the ecclesiasticism of the state church, it has organized churches on essentially congregational principles. Dr. W. is a man of learning and an impressive public speaker. He visited the United States about 1890. He has published a great many books and pamphlets, and 1883 began a new version of the New Testament with notes.

WALDO, *wŏl'dō*, DANIEL (known as 'Father Waldo'): Congregational minister: 1762, Sept. 10—1864, July 30; b. Windham, Conn. He was a soldier in the revolution; taken prisoner at the battle of Horseneck, and confined in the sugar house in New York; exchanged after two months of hardships, and returned home; graduated at Yale 1788; studied theology, and became pastor of Congl. churches at West Suffolk, Conn., Cambridgeport, Harvard, and Salem, Mass., and at Exeter, R. I. In 1855, at the age of 92 years, he was elected chaplain of the U. S. house of representatives. He died at Syracuse, N. Y.—lacking only six weeks of 102 years of age.

WAL'DO, (or VAL'DO, *or* VAL'DEZ), PETER; see WALDENSES.

WALDO, FRANK, American meteorologist: 1857, Nov. 4; b. Cincinnati, O. He was graduated from Marietta College, Ohio, in 1878, subsequently studied at Harvard, and in 1882-23 was in Europe on United States government service. Upon his return to the United States he became instructor in astronomy at Radcliffe College, and was later engaged in teaching meteorology at the Corcoran School of Science, Columbian University. He afterward accepted the position of junior professor in the United States Signal Service, and has since become professor. He has published: *Modern Meteorology* (1893); *Elementary Meteorology* (1896); etc.

WALDOBOROUGH, *wŏl'dō-bŭr-rō:* a town and port of entry in Lincoln co., Me.; on Muscongus river and bay, and on the Knox and Lincoln railroad; 15 m. from the Atlantic Ocean, 19 m. w. of Rockland, 30 m. e. of Bath. It has large shoe and clothing manufacturing interests; and contains hotel, several churches, libraries, a bank, schools and weekly newspaper. It was settled by a German colony 1749. During the year 1903, June 30, the imports of merchandise at its custom-house aggregated $75,141, imported direct from foreign countries. Pop. (1890) 3,505; (1900) 3,145; (1910) 2,056.

WALDSEEMÜLLER, Martin: the scholar who gave America its name. He was born at Freiburg, and his name was written in the school list for the first time at that place 1490, Dec. 7. Assuming that this matriculation occurred when he was 8 or 9 years old, we have as the year of his birth 1481 or 1482. Equally conjectural is the year of his death. In 1522, L. Fries referred to him as deceased, and it has been supposed that the event was then recent. Certain it is that Waldseemüller was canon of St. Dié when he died, and that in the same Vosgian mountain town before 1507 he was regarded as an able young geographer by the little group of learned men there assembled. His *Cosmographiæ Introductro* and his map of the world (the latter prepared as a globe also: *tam in solido quam plano*), both published at St. Dié in the year last mentioned, produced the effect described in our first volume. The name confidently proposed for the transatlantic lands, and at the same time actually conferred upon the new *quarta orbis pars,* in the little Latin treatise and on the hugh wall-map and globe, was so promptly and generally caught up that its originator himself was powerless to recall it. When he issued his *Carta Marina,* in 1516, he had changed his opinion as to the relative value of the achievements of Columbus and Amerigo Vespucci, for the word America does not appear on the map of 1516. But it was, fortunately, too late to impose a name less significant and less appropriate. Of the Waldseemüller map of 1507, 1,000 copies were printed, yet all were destroyed or lost long ago, and, indeed, the same fate had overtaken the Carta itineraria Europæ of 1511, and the Carta Marina of 1516. The Carta itineraria was the first to be recovered; the more interesting maps of 1507 and 1516 did not come to light until 1901, when their discovery created a sensation. In *The Geographical Journal* for 1902, Feb., we read: Ever since Humboldt first called attention to the *Cosmographiæ Introductro* no lost maps have ever been sought for so diligently as those of Waldseemüller. It is not too much to say that the honor of being their lucky discoverer has long been considered as the highest possible prize to be obtained among students in the field of ancient cartography. But until the last few months no specimen of either the globe or map has been seen or

heard of in modern times. A few months ago the geographical world was suddenly startled by a brief announcement that Waldseemüller's long-lost map of 1507, together with another of his of 1516, had been found by Prof. P. Joseph Fisher of Feldkirch, in the library of Prince Waldburg at Wolfegg Castle. In the excellent work by Fischer and Wieser (see below) it is written that Johann Schöner had the two Waldseemüller maps bound in the form of an atlas. To this circumstance we owe the preservation of the two precious cartographic monuments, while those copies that were mounted as wall-maps perished—as it seems, without exception—in consequence of their enormous size. In conclusion we would invite attention to two points: (1) The assertion so commonly made, that Waldeseemüller intended to bestow the name America upon the southern continent only, appears at first sight to find support in the map of 1507, but is disproved by a comparison of the map with the explanatory passages in the *Introductro;* (2) the Greek form of his own name on the map of 1516 is Ilacomilus, showing plainly his preferenec for that spelling toward the end of a rather short life. The fact that his name does not stand in any form upon the map of 1507 is additional evidence of juvenility. He appears to have been so young that his signature might have made good work seem less authoritative then. He was perhaps 25 years old when he produced a word that was to fill a place in all languages during all later ages.

Consult: Fischer and Wieser, *Die älteste Karte mit dem Namen America;* Humboldt, *Kritische Unter suchungen;* d'Avezac, *Martin Hylacomylus Waltzemuller;* Harrisse, *Bibliotheca; Decouverte,* etc.

WALDSTEIN, *wâld'stīn,* CHARLES, A.M., PH.D., LITT.D., L.H.D.: American archæologist: b. New York 1856, Mar. 30. Educated at Columbia and Heidelberg universities, he became university lecturer in classical archæology at Cambridge, England, 1880-2. He was appointed director of the Fitzwilliam Museum there 1883-9, a fellow of King's College, Cambridge, 1893, and has been Slade professor of fine arts at same college 1895-1901, and since 1904. As director of the American School of Classical Studies at Athens (1889-95) and professor (1895-7), he directed excavations with signal success at Platæa, Eretria, etc. He has written: *Excavations at the Heraion of Ægos; Balance of Emotions and Intellect* (1878); *Essays on the Art of Phidias* (1885); *The Work of John Ruskin* (1894); *The Study of Art in Universities* (1895); *The Surface of Things* (1899); *The Jewish Question* (1899); *The Expansion of Western Ideals and the World's Peace* (1899); *The Argive Heraeum* (1902); *Art in the Nineteenth Century* (1903); etc.

WALE, n. *wāl* [AS. *wala,* marks of stripes or blows: Goth, *valus;* Icel. *völr;* Sw. *wal,* a rod, a stick (see WHEAL 1): the raised streak left on the skin by a stripe;

one of the thick timbers in a ship's side below the waterways, also called *bend;* a ridge or streak rising above the surface of cloth, etc.: V. to mark, as the skin, with stripes; to make wales or ridges on. WA'LING, imp. WALED, pp.

WALE, or WAIL, n. *wāl* [Ger. *wahl:* Icel. *val,* choice: Icel. *velja:* Mœso-Goth. *waljan,* to choose]: in *Scot.,* to choose; to select; to cull: N. the thing chosen in preference to another; the act of choosing.

WALES, *wālz,* GREAT BRITAIN, a former Celtic kingdom in the central western peninsula, now an administrative division of England, and a principality, which gives the title of Prince of Wales to the heir-apparent of the British crown. It has an area of 7,466 sq.m., divided into 12 counties. For the names, areas, and populations of the counties see the article ENGLAND: and for statistical matter see GREAT BRITAIN.

Wales is composed of peninsula, with the island of Anglesey at its northwest extremity, joined at the Menai Strait by two remarkable bridges; a number of smaller islands lie chiefly at a short distance from the southwest coast. The peninsula, washed north and west by the Irish Sea, and south by Bristol Channel, and bounded west by the four English counties, Cheshire, Shropshire, Hereford, and Monmouth, is 135 m. long; where widest 95 m., and where narrowest only 35 m. broad. It is very mountainous, particularly in the north division, where Snowdon, the culminating point of South Britain, rises to the height of 3,571 ft.; is intersected by beautiful valleys, traversed by numerous streams, including among others the Severn, which has its source within it; and is rich in minerals, particularly copper in the north, and coal and iron partially there also, but much more extensively in the south. Besides the Severn, the principal rivers are the Dee, the Clwyd, the Conway, the Dovey, and the united Rheidiol and Ystwith, the Teify, the Cleddy and Cleddeu, the Towy and Bury, the Ebwy and Taf, the Romney, and the Usk and Wye. The lakes are numerous, but the largest, that of Bala, is only 4 m. long and scarcely 1 m. broad. The climate is on the whole moderate and equable. The system of agriculture, notwithstanding recent improvements, continues on the whole indifferent. The minerals are very valuable, and the south contains some of the largest coal and iron works in the kingdom, as well as the copper works of Swansea, probably the most extensive in the world. Of manufactures, properly so called, by far the most important are woolens. The principal articles are flannel, for which the principality has long been famous, cloth chiefly of a coarser description, and hosiery. The inhabitants are almost purely Celtic in race, being the descendants of the early Britons, who were able to maintain themselves here when the rest of the country was overrun by the Germanic invaders.

History.—Previous to the Roman occupation Wales

appears to have been chiefly inhabited by three British tribes, called the Silures, Dimetæ, and Ordovices. During the later period of the Roman occupation, perhaps from the reign of Diocletian, the subject part of the island was divided into four provinces, of which one, including the country from the Dee to the Severn, was called Britannia Secunda. It was after the invasion of the Saxons that the country acquired a distinctive national character, as the refuge of the vanquished Britons who were gradually driven to the west, and many of whom migrated to Brittany (q.v.), France, whence the name, and similarity of the Breton language to the Welsh. From this period till the final conquest of the country by Edward I. there is little but a succession of petty wars between the rival chiefs or kings into which both countries during a great part of the Saxon period were divided, or the more systematic efforts of the larger monarchy to absorb the smaller. Among the greatest of the Welsh heroes of the early period was Cadwallon. After being defeated by Edward of Deira, or Northumbria, and compelled to flee to Ireland, he returned and defeated the Saxons in numerous battles, but was at last defeated and slain by Oswald of Northumbria in 635. While the border territories continued to be contested in incessant warfare between the two races, Offa of Mercia built the celebrated dike known by his name to guard the marches which he had conquered. In the middle of the 9th century Roderick, or Rhodi Mawr, succeeded in uniting the whole of Wales into one principality, but he divided it among his sons into three principalities, called respectively Gwynedd (or North Wales), Ceredigion and Dyved (or South Wales), and Powys (composed of parts of the counties of Montgomery, Salop, and Radnor). Soon after this the Danes began to invade Wales. The country was again reunited in the 10th century under Howel, surnamed Da, the Good; but as the English monarchy also acquired unity it gradually prevailed over the smaller principality, and Athelstane received tribute as the sovereign of Wales, although his sway in the country was only nominal. The claim of the conqueror being resisted, William invaded the country and compelled the Welsh princes to do homage, but they continued in virtual independence, and became troublesome to the succeeding Norman monarchs by allying themselves with their disaffected subjects. William and his successors tried to break their spirit by granting fiefs in Wales to Normans and English on condition of conquest, and Henry I. introduced into the country a colony of Flemings. Henry I., Henry II., John, and Henry III., all made with various success a series of efforts to reduce the Welsh princes to submission. Llewellyn and David, princes of North Wales, successively did homage for that dominion to Henry III. On the death of David. Llewellyn revolted against Edward I., but was defeated by Henry, and in a

subsequent revolt was again defeated and slain by the Earl of Mortimer, 1284. His brother David, who followed his example, was taken and executed. Edward I. created his eldest son Prince of Wales, and from this time Wales was united with England.

Consult: Borrow, *Wild Wales: Its People, Language, and Scenery* (1901); Bund, *The Celtic Church of Wales* (1901); Edwards, *Wales* (1901); Rhys and Jones, *The Welsh People* (1900).

WALES, PRINCE OF: title given to the eldest son of the English sovereign since the time of Edward I. In 1902 the Prince of Wales was George Frederick Ernest Albert: b. Marlborough House, 1865, June 3. He entered the navy 1877, June 5, spent two years on the training ship Britannia, and then accompanied by his brother, the late Duke of Clarence, started on a three years' voyage around the world on board the Bacchante. In 1883 he was made a midshipman on the Canada, stationed off the North American coast, and in 1885 was promoted lieutenant. He was made commander in 1890 and opened the Jamaica Industrial Exhibition. In 1891 he visited Ireland with the Duke of Clarence, and, on the latter's death in 1892, became heir to the throne and took his seat in the House of Lords as the Duke of York. He was married to the Princess Victoria Mary of Teck, at St. James' Palace 1893, July 6, the ceremony being attended by the King and Queen of Denmark, the Czarewitch, and other royal and imperial guests. In 1901 he was appointed rear-admiral, and colonel-in-chief of the Royal Marine forces. In 1901, Jan. 22, by the death of Queen Victoria, he succeeded his father as Duke of Cornwall, and with the duchess made a tour of the colonies, opening the first Paliament of the Commonwealth of Australia, and returning in November.

WALES, UNIVERSITY OF: (in Welsh, *Prifysgol Cymru*), a British institution established by charter in 1893, and formed by the union or association of three existing colleges, the University College of Wales, Aberystwith, founded in 1872; the University College of North Wales, Bangor, founded in 1884; and the University College of South Wales and Monmouthshire, Cardiff, founded in 1883. The university has power to grant degrees in arts or literature, science, law, theology, and music; but the constituent colleges do not supply a full course of instruction in each of these subjects, the necessary courses for the degrees of B.A. and B.SC. being at present those chiefly provided. As regards theology, instruction is furnished by a number of theological colleges in the principality, at which students may qualify for the degree of B.D. The classes are open to persons of either sex above the age of 16 years. The first matriculation examination of the university was held in 1895.

WALHALLA, *wŏl-hăl'la*, or VALHAL'LA: in Scandinavian mythology, the 'Hall of the Fallen' (heroes); the

palace of immortality in which those who had fallen in battle reside (see WALKYRIE). This brilliant hall stood in Gladsheim (the house of joy); in front of it was the beautiful grove Glasur, whose trees bore golden leaves. Before the hall, which was so high that its summit could scarcely be seen, a wolf was hung, as a symbol of war, over which sat an eagle; the saloon itself, ornamented with shields and wainscotted with spears, had 540 doors, through each of which 800 of the inmates (Einherjer) could walk abreast. For these Einherjer (i.e., the brave), who came after death to Odin, was it destined. Renowned chiefs, especially if they had desolated many countries and wielded the blood-dripping sword far and wide, were met and welcomed by Bragi and Hermode as messengers from Odin. The hall was decorated to honor them; all the divine heroes stood up at their reception; the Walkyries tasted wine for them, which otherwise only Odin drank. All kings came to Walhalla, even when they did not die on the battle-field: in general, these joys seem to have been prepared only for those of high rank and the rich. As it was honorable to come to Walhalla with a great retinue and to possess many treasures, the comrades of a leader who had fallen in battle killed themselves of their own free will; and in his grave were laid, with his horse and arms, the treasures won in fight. Every morning the inmates of Walhalla marched out at the crowing of the cock and fought furiously with one another; but at midday all wounds healed, and the heroes assembled to the feast under Odin's presidency. Odin himself partook of nothing but wine; he gave the edibles to the wolves Geri and Freki, who sat beside him. The guests ate of the bacon of the boar Sahrimmer, prepared by the cook Andhrimmer, in the kettle Eldhrimmer [see note below], and refreshed themselves with beer and mead, which flowed in abundance from the udder of the goat Heidrun; the attendant Walkyries handed them the drinking-horns, under Freyja's direction. Occasionally the hero rode by night to his grave, where the beloved Walkyrie received him; he reposed in her embrace till morning appeared, when he exclaimed: 'It is time to make the horse tread on the white stair of the sky; I must travel toward the west to the bridge of heaven before the cock awakes the warriors in Walhalla.' [Note.—*Sa* is explained as signifying water; *and*, breath or soul; *eld*, fire; *hrim*, i.e., frost, was the primitive matter of which the world was made from the branches of the deer Eikthyrnir, standing over Walhalla, drops fell into the well Hvergelmer, from which all rivers flowed. According to this, the heroes appear to be conceived as stars or spirits of the constellations, which draw their nourishment from the elements; and Walhalla stands for heaven.]

The name WALHALLA is given to a magnificent structure erected by Ludwig I. of Bavaria (1830-41) as a

temple of fame for all Germany. He conceived the project 1806, when the Fatherland was at its lowest point of degradation, and while he was yet crown-prince. The design of the building was by Klenze, and the chief sculptors of Germany have contributed to the execution of the plan. It stands on an eminence 250 ft. above the Danube at Donaustauf, near Regensburg. The temple is of nearly the same dimensions and proportions as the Parthenon, and is built of marble. By statues, busts, reliefs, and tablets, the mythology and history of Germany are illustrated, and her greatest names commemorated. The undertaking cost 2,330,000 florins, about $1,165,000.

WALK, v. *wawk* [AS. *wealcan*, to roll, turn, tumble: Icel. *válka*, to roll in the hands: OHG. *walagôn*, to walk: Ger. *walken*, to full; *walker*, a fuller: Bav. *walken*, to move to and fro—*lit.*, to roll or wander about]: to go at a foot's pace; to go or travel on foot; to pace; to pass through; to lead; to ramble; to live or behave; to pursue a particular course of life; in the language of invitation, come; go; to move for exercise or amusement; to appear as a spectre; to cause to go slowly, as to *walk* a horse; in *OE.*, to be in motion: N. act or manner of walking; pace; step; space through which one has walked; a place for exercise on foot; road; way; course of life; carriage; gait; deportment; pasture-ground, as for sheep; in *OE.*, avenue set with trees; region; space. WALKING, imp.: N. the act of moving on the feet at a slow pace. WALKED, pp. *wawkt*. WALK'ER, n. *-ėr*, one who walks; in *OE.* and *Scot.*, a fuller. WALKING-CANE, a walking-stick (q.v.). WALKING-FISH, a fish found in the Indian seas, with fins adapted to crawling on shore. SHEEP-WALK, an extensive tract of land where sheep are pastured. WALK OF LIFE, station or position.—The *walk* is the slowest pace or gait at which land animals move. When a biped *walks* there is always one foot on the ground; when a quadruped walks there are at least two feet on the ground at one time. In the walk of the horse and other quadrupeds the feet move in diagonal pairs—i.e., the near forefoot and the off hindfoot move together, and the off forefoot and the near hindfoot together. In the *trot* the feet move in the same way, but not with the same degree of simultaneousness.

WALKE, *wawk*, HENRY: naval officer: b. Princess Anne co., Va., 1808, Dec. 24. He entered the U. S. naval service as midshipman in 1827; d. 1896, Mar. 8.; became lieut. 1839; served in the Gulf squadron during the war with Mexico; promoted commander 1855. At the opening of the civil war he was in command of the Pensacola navy-yard. He served on the Mississippi 1861-63, and took part in the battle of Belmont, in co-operation with the land forces under Gen. Grant; for his conduct in command of the *Carondelet* at Fort Henry, 1862, Feb. 6, he, with the other officers of the naval squadron, re-

ceived from congress and the state of O. votes of thanks; in the operations that resulted in the capture of Fort Donelson, Walke, with the *Carondelet*, from first to last bore the brunt of the fight. Equally brilliant were his services with the *Carondelet* at Fort Pillow 1862, May 11, and Memphis, June 6. Commissioned capt. July 16, he ran past the batteries at Vicksburg on board the ram *Lafayette*. He co-operated with the army in the battle of Grand Gulf, 1863, Apr. 29; dispersed an army under Gen. Richard Taylor at Simsport, La., and blockaded the mouth of the Red river June 4. Then he took command of the steamer *Fort Jackson*, and continued operations on the Mississippi till Sep. 24, when he was appointed to the command of the *Sacramento* and to pursue the *Alabama*, Confederate cruiser. He became commodore 1866, July 25, rear-admiral 1870, July 13; and was placed on the retired list 1871, Apr. 26.

WALKER, *waw'kėr*, AMASA, LL.D.: political economist: 1799, May 4—1875, Oct. 29; b. Woodstock, Conn. Having received a district-school education, he entered commercial life in 1820. He retired from business 1840, and 1842-48 lectured on political economy in Oberlin Coll., O. Returning to Mass., he was elected to the Mass. senate 1849, and promoted the enactment of a law for a secret ballot; he was sec. of state of Mass. 1851-2; member of the Mass. constitutional convention 1853; examiner in polit. economy at Harvard 1853-60; lecturer on polit. economy at Amherst 1859-69; in the meantime was representative in congress 1862, Dec. 1—1863, Mar. 3. Through life he was an earnest advocate of total abstinence and of anti-slavery. He was repeatedly a delegate to international peace congresses. His contributions to *Hunt's Merchant's Magazine* have been highly esteemed by students of finance. He published *Nature and Uses of Money and Mixed Currency* (1857); *Science of Wealth: a Manual of Political Economy* (1866).

WALKER, BENJAMIN: soldier: 1753-1818, Jan. 13; b. England. Arriving at an early age in New York, he there became a merchant; served as captain and as aide to Baron Steuben and Gen. Washington in the revolutionary war. After the war he was secretary to the governor of New York and later was a broker in New York. He was naval officer there during Washington's administration, and was representative in congress 1801-03. For many years before his death he was manager of the Earl of Bute's great estates in the centre of the state.

WALKER, FRANCIS AMASA, PH.D., LL.D.: statistician: b. Boston, 1840, July 2; d. 1897, Jan. 5; son of Amasa Walker. He graduated at Amherst 1860, and studied law. He entered a Mass. vol. regt. 1861, Aug. 1, as sergeant-maj.; appointed asst. adjt.-gen. of a brigade, with rank of capt., Sep. 14; adjt.-gen. of a division, with rank of maj., 1862, Aug. 11; promoted col. on the staff of the 2d army corps Dec. 23. He was severely wounded

at Chancellorsville 1863, May 1; made prisoner at Ream's Station 1864, Aug. 25, and was confined in Libby Prison, Richmond. His health having been seriously impaired by the confinement, he resigned his commission 1865, Jan. 12; he was breveted brig.-gen. 1865, Mar. 13. After the war he was teacher of Latin and Greek at Williston Seminary 1865-67; was chief of the statistical bureau of the treasury 1869; supt. of the 9th census 1870-72, and during the same term commissioner of Indian affairs; was prof. of polit. economy and history in the Sheffield School at Yale Univ. 1873-81; then became pres. of the Mass. Institute of Technology in Boston. He was chief of the bureau of awards at the Centennial Fair, 1876, and supt. of the 10th U. S. census 1879-81; U. S. commissioner to the Paris international monetary conference 1878. Besides his official reports, Dr. Walker published *The Indian Question* (1874); *The Wages Question* (1876); *Money* (1878); *Money, Trade, and Industry* (1879); *Land and Its Rent* (1883); *Political Economy* (1883); *History of the Second Army Corps* (1886). He published many articles on economic and social questions.

WALKER, Frederick: English painter: b. London 1840, May 26; d. Saint Fillans, Perthshire, 1875, June 4. After an ordinary school education he worked for a time in an architect's office, and then pursued his art studies at the British Museum, in an Art Academy, and in the Royal Academy schools. He became an apprentice to Whymper, the wood engraver, in 1858, and soon afterward began to provide drawings for *Good Words*, the *Cornhill Magazine* and other periodicals. He illustrated the *Adventures of Philip* and the *Denis Duval* of Thackeray. He exhibited his first oil picture, *The Lost Path*, at the Academy in 1863. He was elected an associate of the Old Water-color Society in 1864, and in 1871 he became an associate of the Royal Academy. His principal pictures in oils were: *Wayfarers* (1866); by some considered his best oil-painting; *Bathers* (1867); *Vagrants* (1868), in the National Gallery; *The Old Gate* (1869); *The Plough* (1870); *At the Bar* (1871); *The Harbour of Refuge* (1872), in the National Gallery; and *The Right of Way* (1875). Among his more numerous works in water-color the following may be mentioned: *Philip in Church* (1863); *The Young Patient; The Shower; The Village School; Jane Eyre; Refreshment; Spring; Autumn* (1865); *The Bouquet* (1866); *The Gondola; In a Perthshire Garden; The Housewife; The Rainbow;* and *The Fishmonger's Shop.* Consult Marks, *Life and Letters of Frederick Walker* (1896).

WALKER, George, d.d: Irish clergyman, distinguished in the heroic defence of Londonderry against the army of James II.: b. in the early part of the 17th c., in the county of Tyrone; of English parents; d. 1689, July 1. (o.s.). He was educated at the Univ. of Glasgow, and became rector of Donoughmore. When the

Irish army of James II. (see JAMES II., King of England) entered Ulster and took possession of Kilmore and Coleraine, Walker sought refuge in Londonderry (q.v.), the headquarters of 'the Englishry' since the times of James I. The town was fortified sufficiently to protect it from the pike-armed Celtic peasantry; but not for defense against regular troops. Lundy, the governor, was in secret communication with the enemy, and the bishop, Ezekiel Hopkins, inculcated the doctrine of passive obedience; but the high-spirited citizens determined not to yield. A daring band known as the 'thirteen Scotch apprentices' closed the city gates and defied the enemy. It was then that Walker, described as an aged clergyman who had taken refuge in the city, encouraged the townspeople to fight to the last. Walker saved Lundy from the rage of the populace, and enabled him to quit the city in safety. Major Baker (who soon afterward died) and Walker became joint-governors, aided by Capt. Adam Campbell. The siege (1689, Apr. 18—July 30) is memorable in British history. The inhabitants were reduced to the greatest extremities by hunger, but they were sustained to the last by the rousing sermons preached to them in the cathedral by Walker, and by the example of Walker and Capt. Campbell in leading sallying parties. When the siege was raised by the Eng. fleet entering the harbor, Walker went to London, was warmly received at court, thanked by the house of commons, created D.D. by Oxford, and bp. of Derry by the king. His triumph would have been complete had the Presbyterians not provoked useless controversy, claiming that their share in the defense of the city was overlooked. Walker could not be induced to take quiet possession of his bishopric; he would head a troop at the battle of the Boyne, and he was there killed.

WALKER, JAMES, D.D., LL.D.: Unitarian minister, philosopher and educator: 1794, Aug. 16—1874, Dec. 23; b. Burlington, Mass. Having graduated at Harvard 1814, he studied theology and was thereafter pastor of a Unitarian church in Charlestown, Mass., for 21 years, in the meantime lecturing in various places in the interest of popular education. He edited the *Christian Examiner* 1831-39. On resigning his pastoral charge 1839, Walker became prof. of intellectual philosophy in Harvard, and was pres. of Harvard 1853 till he resigned 1860. His library, valued at $15,000, he bequeathed to Harvard. Dr. Walker had, in fine combination, intellectual strength and moral delicacy and fidelity. His sermons, lectures. and other addresses were from time to time collected and published under the titles *Natural Religion; Philosophy of Religion; Sermons Preached in the Chapel of Harvard Coll.* He wrote a *Memorial of Daniel Appleton,* and a *Memoir of Josiah Quincy.* He edited for students' use Dugald Stewart's *Philosophy of the Active and*

Moral Powers, and Thomas Reid's *Essays on the Intellectual Powers.*

WALKER, James Barr, D.D.: Presbyterian clergyman: 1805, July 29—1887, Mar. 6; b. Philadelphia. He learned the printer's trade at Pittsburgh, Penn.; walked from Pittsburgh to New York 1826, and there was employed as clerk in a newspaper office. He went to Ohio, studied law at Ravenna, graduated at Western Reserve College 1831; and afterward edited in succession several religious newspapers. He was licensed to preach by the Chicago presbytery 1841. He lectured on the relations of science and revelation at Oberlin College, Ohio, and at the Chicago Theological Seminary (Congl.). Walker published anonymously, 1855, *The Philosophy of the Plan of Salvation*, a work which commanded wide attention; under his own name he published *God Revealed in Nature and in Christ* (1855); *Philosophy of Scepticism and Ultraism* (1857); *Doctrine of the Holy Spirit* (1870); and some other works.

WALKER, John Grimes: naval officer: b. Hillsborough, N. H., 1835, Mar. 20; d. York Beach, Me., 1907, Sept. 16. Having graduated at the Naval Academy 1856, he entered the United States navy; was promoted master and lieutenant 1858. During the Civil war he served in the blockade of the Atlantic coast 1861-2, and then in the western Gulf blockading squadron. He took part in the operations of the fleet at New Orleans and Vicksburg, Haine's Bluff, Fort Hindman, and the Yazoo expedition. He again served in the Atlantic blockading squadron 1864-5, and participated in the taking of the forts near Wilmington, N. C. Walker attained the rank of commander 1866, captain 1877. He was chief of the bureau of navigation 1881-89; was then assigned to command of the European squadron as acting rear-admiral; rear-admiral 1893; president naval retiring board, Washington, 1895; of Nicaragua Canal Commission 1897-99; president Isthmian Canal Commission 1899.

WALKER, Jonathan: advocate of abolitionism: 1799-1878, May 1; b. Cape Cod, Mass. In early life he was captain of a fishing-vessel; was railroad contractor in Florida 1840; aided slaves to escape thence in an open boat 1844, but the party were taken to Key West by a wrecking-sloop, which found them helpless at sea. Walker was carried in irons to Pensacola, held for some time in prison chained to the floor of a dark cell, and on being tried was convicted, fined, condemned to the pillory, branded 'S. S.' (slave-stealer) on the right hand, and ordered to be confined in prison till the fine was paid. He was liberated after 11 months' imprisonment on payment of the fine by friends in the north. He then for some years delivered lectures on slavery, and 1850 settled in Muskegon, Mich. Walker's history suggested to Whittier the topic of his *Man With the Branded Hand.*

WALKER, Robert James: statesman: 1801, July 23—1869, Nov. 11; b. Northumberland, Penn.; son of a revolutionary soldier and United States district judge. He graduated at the University of Pennsylvania, 1819; began to practive law at Pittsburgh 1822; settled in Mississippi 1826, and there besides practicing law entered political life; he was an earnest opponent of nullification, and favored federal coercion of states attempting to nullify the laws of the United States, 1832-3. He was elected to the United States senate 1836, Jan.; re-elected 1840, and in that body antagonized John C. Calhoun. He opposed President Van Buren when Van Buren disapproved the annexation of Texas. Walker then was influential in procuring the nomination of James K. Polk to the presidency, and on his election to that office Polk made Walker secretary of the treasury. While in the senate Walker proposed the Homestead Bill, advocated the conclusion of the treaty for suppressing the slave-trade, and supported all measures looking toward emancipation; he freed his own slaves 1838. He was made governor of Kansas by President Buchanan 1857, and in that office resisted the attempt to impose on Kansas a fraudulent constitution. At the outbreak of the civil war he advocated vigorous action to suppress the revolt of the slave-holding states. He was financial agent of the United States in Europe, and negotiated the sale of $250,000,000 in government bonds 1863. He returned to the practice of law in Washington 1864.

WALKER, Sears Cook: mathematician: 1805, Mar. 28—1853, Jan. 30; b. Wilmington, Mass. Having graduated at Harvard 1825, he was a schoolmaster first near Boston; then in Philadelphia, where he erected an astronomical observatory for the pupils of the high school 1837, and had it furnished with superior instruments: he published the results of his observations and researches periodically in the *Proceedings* of the Philosophical Soc. and the *Amer. Jour. of Science* 1840-52. While employed in the United States Observatory, Washington, 1845-47, he identified the then newly discovered planet Neptune with the star discovered by Lalande 1795. Thereafter till his death Walker was in charge of longitude computations for the coast survey. Among his more notable contributions to science are: *Memoir on the Periodical Meteors of Aug. and Nov.* (1841); *Researches Relative to the Planet Neptune for* 1848-52.

WALKER, Thomas: planter: 1715, Jan. 25—1794, Nov. 9; b. Gloucester co., Va. Having been educated at William and Mary College, he became a physician at Fredericksburg, Va. He made an expedition 1750 to the region that now is the state of Kentucky—13 years before Daniel Boone entered it from Tennessee. The Walker Mts. in southern Virginia are named after Walker. He served as commissary general under George

Washington in Braddock's army; was commissioned on behalf of Virginia to treat with the Six Nations at Ft. Stanwix, N. Y., 1768; commissioner to treat with the Indians at Ft. Pitt (Pittsburgh) 1777. He acquired a great estate by marriage toward the close of his life.—His son JOHN WALKER (1744-1809, b Albemarle co., Va.) served with distinction on Gen. Washington's staff during the revolution: he was United States senator a few months 1790.

WALKER, TIMOTHY: clergyman: 1705, July 27—1782, Sept. 1; b. Woburn, Mass. He graduated at Harvard 1725, and having studied theol. became (1730) minister of the Congl. chh. at the Penacook plantation (now Concord, N. H.). When, 1740, the title of the Penacook settlers to their land was held by the province of New Hampshire to be null, and new claimants demanded possession, the courts deciding favorably to them, Walker undertook the defense of his people's rights, and thrice visited England to maintain their cause; finally the king in council decided the suit in favor of the people of Penacook. Walker's theological belief was mildly Calvanistic. In the revolution he was an ardent patriot. He held the pastorate at Concord 52 years. His daughter married Count Rumford. Walker's son TIMOTHY WALKER (1737, June 26—1822, May 5) graduated at Harvard 1822, and at first was a preacher; then became active in political life of the revolutionary time and the period subsequent—holding many important offices.

WALKER, WILLIAM: adventurer: 1824, May 8—1860, Sept. 12; b. Nashville, Tenn. Having studied law in Nashville, and medicine in Heidelberg, he was first a journalist in New Orleans and San Francisco. At the head of 170 men with 3 field-guns, he descended on La Paz, Lower California, 1853, July, intending to conquer the state of Sonora; but was attacked by Mexican troops and compelled to seek refuge in United States territory. He was tried at San Francisco on charge of acts against the peace of the United States, and acquitted. Walker's next filibustering expedition was to Nicaragua. Landing with 62 followers at Realejo 1855, June 11, he enlisted some native Nicaraguan malcontents, and attempted to seize the s. transit-route. He suffered defeat at Rivas, but, having obtained a fresh native reinforcement, routed the government force at La Virgen Sept. 1, and captured the city of Granada. He was then accepted as an ally by the existing government and appointed secretary of war and commander-in-chief; as such he was (1856, Mar. 1) in command of an army of 1,200 men, many of whom had come to him from the United States. War now broke out between Nicaragua and Costa Rica, and Walker, though defeated in the first collision, routed the Costa Ricans at Rivas Apr. 11. He was now ruler of Nicaragua. To fill the treasury, he confiscated the property of the Vanderbilt Steamship Co., and revoked its charter. He

procured his own election to the presidency, and by decree annulled the law prohibiting slavery. His acts provoked the people to revolt; and, abandoned by his army, Walker took refuge on board a United States sloop of war at San Juan del Sur 1857, May 1; and was put under bonds at New Orleans to keep the peace; but engaged in still other filibustering enterprises—the last was against Honduras; there he was made prisoner by the commander of a British naval vessel, was surrendered to the Honduras authorities, tried by court-martial, and shot to death at Trujillo.

WALKER, William Johnson, M.D.: philanthropist: 1790, Mar. 15—1865, Apr. 2; b. Charlestown, Mass. He graduated at Harvard 1810, then studied medicine, and practiced as a physician in Charlestown. He became heir to a large estate late in life. His benefactions to colleges and to charitable and benevolent institutions were very liberal, amounting to $1,400,000, of which $400,000 was bestowed during his life.

WALKER, William McCreary: naval officer: 1813, Sept. 2—1866, Nov. 19; b. Baltimore, Md. He became midshipman in the United States navy 1827; passed midshipman 1833; lieutenant 1838; and while lieutenant commanded a vessel in Wilkes's exploring expedition. He served on the home station 1843-4, and in the Mediterranean squadron 1844-46; commanded the frigate *Constellation* 1855-6. He attained the rank of captain 1862; through the Civil war he served with distinction on the steamer *De Soto* of the Atlantic coast blockading squadron.

WALKER, William Sidney: English Shakespearian scholar: b. Pembroke, Wales, 1795, Dec. 4; d. 1846, Oct. 15. He was educated at Trinity College, Cambridge, becoming a fellow of his college in 1820. Unorthodox views regarding eternal punishment prevented him from taking orders, and accordingly he had to resign his fellowship in 1829. His friend Moultrie edited in 1852 a collection of his *Poetical Remains*, and W. N. Lettsom compiled from his papers the works entitled *Shakespeare's Versification, and Its Apparent Irregularities Explained by Examples from Early and Late English Writers* (1854); and *A Critical Examination of the Text of Shakespeare, with Remarks on His Language and That of His Contemporaries, Together with Notes on His Plays and Poems* (1860), which are of the utmost value to students of Shakespeare and Elizabethan literature.

WALKER, Williston, PH.D., D.D.: American church historian: b. Portland, Me., 1860, July 1. He was graduated from Amherst College in 1883 and from Hartford Theological Seminary in 1886. He was professor of church history at the latter institution 1889-1901, and since 1901 has held a similar post at Yale University. He has published: *The Creeds and Platforms of Congre-*

gationalism (1893); *A History of the Congregational Churches in the United States* (1894); *The Reformation* (1900); *Ten New England Leaders* (1901); *John Calvin* (1906).

WALKER'S BATTERY, in *Electricity:* a battery in which the electro-negative plate is gas graphite or platinized graphite. It is excited by dilute sulphuric acid.

WALKERTON, Canada: capital of Bruce co., Ontario, 65 m. n.w. of Guelph, on the Sangeen river, and on the Wellington, Grey and Bruce railroad. It is a thriving and growing town; with extensive water power, several mills, iron foundry, and other industrial establishments. Pop. (1901) 2,971.

WALKERVILLE, Canada: a town of Essex co., Ontario, on the Detroit river, 2 m. n.e. of Windsor, near the outlet of Lake St. Clair. It has ship-building yards, a distillery, and other industrial establishments. Pop. (1901) 1,595.

WALKILL RIVER. See WALLKILL.

WALKING DELEGATE: an official connected with a trade union, whose duty it is to visit the various places at which members of his craft are employed, and personally ascertain that no laws of that particular trade guild are infracted by the workmen; also, in cases where an unexpected strike has been ordered by the executive board, it devolves on him to notify men connected with the union to cease work. See UNIONISM.

WALK'ING-LEAF. See LEAF-INSECT.

WALKING PURCHASE, THE: in 1682 William Penn purchased of the Delaware Indians a tract of land in the present counties of Bucks and Northampton, Pa., bounded on the e. by the Delaware river, and in the interior at a point as far as a man could walk in three days. Penn and a party of Indians started on the walk, beginning at the mouth of Neshaming creek. At the end of a walk of a day and a half Penn concluded that it was as much land as he wanted and a deed was given to the lands at that point—about 40 m. from the starting place. In 1737 after Penn's death the tract was increased by a party of expert walkers to a point 70 m. in the interior instead of 40 m.

WALK'ING-STICK: popular name of many insects of the family *Phasmidæ* (q.v.), which are destitute of wings, and have a long, slender, cylindrical body, like a small stick with the bark on, the delicate-legs resembling little twigs. Their habits are very similar to those of the leaf-insects or walking-leaves, and their peculiar appearance is, in like manner, their protection. Most of them are natives of warm climates, and they are widely distributed. Some attain a large size. *Phasma gigas,* an East Indian species, is 7 or 8 in. long. A species, between 3 and 4 in. long, *P. femoratum,* is found even in n. and n.w. parts of the United States.

WALKING STICK, *wawk'ĭng-stĭk:* a cane or rod prepared for use in walking, either as an assistance in supporting and steadying the walker, or for ornament. The habit of using walking-sticks is of great antiquity; and in modern times the supply of such articles constitutes a large branch of trade in the United States, as well as in European countries, especially in Great Britain, France, and Germany. London is a great mart for all kinds of walking-sticks, and over 4½ million sticks in the raw state, to be afterward dressed and mounted, are annually imported into Great Britain. These consist chiefly of the small stems or canes of certain palms, as the Malacca cane, and others called Whangee and Penang Lawyers; the woody stems of some small species of bamboo also are used, besides straight shoots of orange, cinnamon, myrtle, and other shrubs: oak, ash, hazel, sloe, thorn, and other native trees and shrubs, also are used. The preparation and sale of walking-sticks are extensively carried on in Hamburg, and the finer sorts are richly and tastefully mounted in Paris.

WALKYRIE, *wŏl-kĭr'ĭ,* or VALKYR, *văl'kĭr:* in Scandinavian mythology, one of a company of nine or more beautiful maidens, attendants of Odin (q.v.), who, clad in brilliant armor and adorned with golden ornaments, ride through the air, order battles, and distribute the death-lots according to Odin's commands. Fertilizing dew drops on the ground from the manes of their horses; light streams from the points of their lances, and a flickering brightness announces their arrival in the battle. With their charming glance they rejoice the glazing eye of the hero, and lead him to Walhalla (q.v.), where they act as his cup-bearers. Two Walkyries, Hrist and Mist, are cup-bearers to Odin himself. The name is derived from the Icelandic *Valkyrja,* and means literally 'chooser of the slain,' from *valr,* the 'slain,' and *kjora,* to 'choose.'

They differ in origin: some spring from Elves and other superhuman beings; some are daughters of princes, who in their lifetime are numbered among the Walkyries, showing all their qualities, and when they die their spirits become Walkyries. They ride generally in companies of three, or of three times three or four times three, and have the gift of changing themselves into swans—hence sometimes called swan-maidens. They often choose noble heroes for lovers. Whoever deprives a Walkyrie of her swan-robe gets her into his power. But the song of the Walkyries sounds terrible, as, sitting on a hill, they weave the fateful battle-web. The Walkyries were frequently confounded with the Norns or Destinies. They were conceived also under the figure of the clouds: thus, Hrist signifies 'dark sky,' and Mist signifies 'quaking.' Most of the names of the Walkyries, however, relate to war and battle.—The Walkyries were known also as *battle-maidens, shield-maidens,* and *wish-maidens.*

WALL, n. *wawl* [AS. *weal,* a wall: Dut. *wal,* a ram-

part: Ger. *wall,* a bank or dike: all derived from L. *vallum,* the palisade or fortification of a camp—from *vallus,* a stake]: a structure of stone, brick, turf, or other material raised to some height, and serving to inclose or defend a space of ground or buildings; the side of a building; defense; means of protection; in *min.*, the cheeks or sides of a vein: V. to inclose with a wall; to close or fill with a wall; to defend with walls. WALL'ING, imp.: N. act of inclosing with a wall; materials for a wall; walls in general. WALLED, pp. a. *wawld,* fortified or inclosed with a wall. WALLFLOWER, fragrant flowering-plant (see below); *colloquially,* a person, particularly a lady, who sits by the wall at a ball or party, and takes no part in the dancing, either from choice, as being unable or unwilling to dance, or from inability to find a partner. WALL-FRUIT, fruit growing on trees trained on a wall. WALL-PAPER, paper-hangings. WALL-PLATE, a piece of timber placed along the top of a wall to receive the ends of the roof-timbers, or so placed as to receive the joists of a floor. WALL-RUE, a common fern, the *Asplēnĭum ruta-murārĭa.* WALL-SALPETRE, a salt occurring in efflorescent silky tufts and coatings of a white or gray color on old walls, in limestone caverns, and on calcareous rocks; also called *nitrocalcite.* TO DRIVE TO THE WALL, to push to extremities; to get the mastery over. TO GO TO THE WALL, to be hard pressed or driven; to be pushed to one side; to be the weaker party. TO TAKE TO THE WALL, *formerly,* when streets were narrow and ill paved, to take the inner side of a walk, or the side next the wall, as the best and safest place; *hence,* to take precedence. In *mining,* to denote the surfaces of the rock between which the ore is inclosed. If the vein is inclined at such an agle that the ore is over the miner's head it is termed a 'hanging' wall; if it is beneath him it is called a 'foot' wall.

WALLABA-TREE, *wŏl'la-bâ-* (*Eperva foliata*): tree of nat. order *Leguminosæ,* sub-order *Cæsalpineæ,* native of Guiana. The wood is deep red, often variegated with whitish streaks, hard, heavy, shining, resinous, and durable.

WALLABOUT, *wŏl'a-bowt,* BAY: small arm of the East river, extending into Long Island at Brooklyn, opposite the s.e. corner of Manhattan Island. It is separated from the river by an island, which, with the land bordering on the bay, belongs to the United States, and is the site of the Brooklyn navy-yard. During the revolution the British prison-ships were stationed in Wallabout Bay.

WAL'LABY: a native name applied to various small kangaroos, especially those called brush-kangaroos, which frequent dense scrub-jungle and have great leaping powers. One of the largest species is the red-necked (*Macropus ruficollis*), which is 40 in. or more long, with

a tail 30 in. in length; it is South Australian, and is represented in Tasmania by the smaller Bennet's wallaby. Several other species occur in Australia and Borneo, one of which (*M. theditis*) is very common and known to the colonists as pademelon.

WALLACE, *wŏl'lĭs*, Alfred Russel: English traveller and naturalist: b. Usk, in Monmouth, 1822, Jan. 8. He was educated as a land-surveyor and architect; but from 1845 he applied himself to scientific researches. He spent four years on the Amazon, and eight years among the Malay Islands, making extensive zoological collections. While living in the east, unaware of Darwin's cognate researches and speculations, Wallace formed and committed to writing a theory of development by natural selection, though not using the latter term. Valuable contributions to zoology, botany, and cognate subjects are in his *Travels on the Amazon and Rio Negro* (1853); *Palm Trees of the Amazon* (1853); *The Malay Archipelago* (2d ed. 1869); *Contributions to the Theory of Natural Selection* (1870); *The Geographical Distribution of Animals* (1876), practically founding a new science; *Tropical Nature* (1878); *Island Life* (1880). His recent work, *Darwinism* (1889), is a *résumé* more Darwinian than those writers who now are so called, but rejecting sexual selection, and closing with proofs that a spiritual power has intervened to introduce a new element, repeatedly, in the history of life. Wallace is a believer in spiritualism, and has published works on that subject—among them, *Miracles and Modern Spiritualism.* He accepted, with modifications, the views of Henry George on property in land about 1880, and published *Land Nationalization, Its Necessity and Its Aims* (1882); ever since he has been a zealous advocate of the dispossession of the landlords of England and the ownership of the soil by the people or state. Among other works on social questions he has published *Forty-five Years of Registration Statistics, Proving Vaccination to be Both Useless and Dangerous* (1885); *Bad Times, an Essay on the Present Depression of Trade* (1885). Since 1881 Wallace has had a civil-list pension of $1,000 a year in recognition of his service in natural science.

WAL'LACE, Horace Binney: author: 1817, Feb. 26—1856, Dec. 16; b. Philadelphia. Having graduated at Princeton 1835, he studied medicine, chemistry, and law, but never adopted any profession. He travelled in Europe 1849-50 and 52, everywhere seeking the conversation of philosophical thinkers. He published a novel, *Stanley* (1838); *Art, Scenery, and Philosophy in Europe* (1855); *Literary Criticism, and Other Papers* (1856). He assisted Rufus W. Griswold in preparing his *Napoleon and the Marshals of the Empire;* he was co-editor with J. I. Clark Hare in compiling *American Leading Cases in Law,* etc.

WALLACE, John Findley: ex-chief engineer of the Panama Canal; b. Fall River, Mass., 1852, Sept. 10. He was educated at Monmouth College, Ill., of which his father was president, and where T. P. Shonts (q.v.), chairman of the Panama Canal Commission, was a fellow-student. He graduated from the University of Wooster; was employed in railway service in 1869-70; in 1871, was appointed assistant engineer of the United States engineers; and became county surveyor and city engineer in 1878. He was superintendent and chief engineer on several railroads from 1879 to 1891, in the latter year joining the Central railroad, and in 1902 becoming general manager of the Illinois Central railroad. In 1904, he was appointed chief engineer of the Panama Canal, and reappointed in 1905, on the reorganization of the Canal Commission, being also appointed chief engineer, vice-president, general-manager, and director of the Panama railroad, but resigned.

WAL'LACE, Lewis: soldier and novelist: b. Brookville, Ind., 1827, Apr. 10; d. Crawfordsville, Ind., 1905, Feb. 15. He was studying law in Indianapolis when the war against Mexico began, and entered an Indiana regiment as lieutenant. After the war he practiced law. In the civil war he served first in West Virginia as lieutenant-colonel; was commissioned brigadier-general of volunteers 1861; after the capture of Fort Donelson, in which he showed high ability, he was made major-general. He rendered efficient service in the battle of Shiloh and in the army movements next following that action, and at Corinth. He was appointed commander of the middle department and eighth army corps, with headquarters at Baltimore, Md., 1863; and with a far inferior force stayed the advance of Early, who was marching on Washington at the head of 28,000 men, 1864, July. Ben. Halleck removed Wallace from his command on account of his misadventure on the *Monocacy* July 9, but he was honorably reinstated by Gen. Grant. Wallace was member of the court-martial that tried the assassin of President Lincoln. He was governor of Utah 1878-81; United States minister at Constantinople 1881-85; special envoy to Hayti 1889. He published *The Fair God* (1873); *Ben-Hur: a Tale of the Christ* (1880); *Boyhood of Christ* (1888); *The Prince of India* (1893).

WALLACE, William: American manufacturer: b. England 1825; d. Washington 1904, May 20. Early in life he came to the United States with his father and established the firm of Wallace & Sons at Ansonia, Conn., which soon became one of the leading manufactories of copper and brass alloys in the United States. Becoming associated with Moses G. Farmer (q.v.), they began the manufacture of a compound telegraph wire, consisting of a steel core and an electrotyped copper covering, thus giving conductivity and strength, combined with lightness. In 1876, at the Centennial exposition, he brought

out the Farmer-Wallace dynamo machine, with which the buildings were successfully lighted, being the earliest general electric lighting in this country. A year or two later he devised a plate arc lamp for use with this machine, by means of which a number of arc lights could be placed in series on the circuit, thus originating the series method of arc lighting. For several years before his death he was engaged in scientific investigation, especially in work with the microscope.

WAL'LACE, Sir WILLIAM: great Scottish patriot: 1270 (?)—1305, Aug. 23; younger son of a knight, Sir Malcolm Wallace (as is believed), in s.w. Scotland. Neither the date nor place of his birth has been ascertained. Nothing certain is known of his education or his early years. Blind Harry's half-fabulous poem has indeed inseparably associated his birth with Ellerslie, his boyhood with Dundee, and his youthful manhood with Ayrshire; but his true history, even in the next generation, had become so obscure that it is now impossible to separate truth from falsehood or exaggeration. He appears, in the light of authentic history, first as chief of a band of insurgents (1297), against Edward, King of England. Edward—taking advantage of his superior power, of his influence over the barons of Norman race, then foremost among the nobility of Scotland, and of the position of umpire to which he had been chosen by the various claimants to the Scottish crown—had established his supremacy over the northern kingdom, and afterward deposed John Baliol, and attempted to govern in his own absolute right. See SCOTLAND—*History*. The injustice of the claim, and the cruelty with which it was enforced, roused the opposition of all classes in Scotland except the higher nobles. The gentry and the middle and lower classes of the Lowlands had for many years identified themselves with the country in which they dwelt, rather than with the great English race from which most of them drew their descent; and what has been called the War of Independence began, which resulted in a brief deliverance of Scotland from foreign rule, at the cost of the comparative civilization and tranquillity which the country had enjoyed under the descendants of Malcolm Canmore. That this independence was not made permanent was due to the jealousy of the higher nobles and to their sympathy with the English cause. In this struggle Wallace was the most successful leader; and in 1297 the insurrection became general. Edward himself was in Flanders; but his general in Scotland, the Earl of Surrey, led his army to Stirling. Sept. 11 they conquered the Scots under Wallace, and were completely defeated. The whole kingdom submitted to Wallace, who, passing the Border, ravaged Cumberland and Northumberland without opposition. On his return from this expedition, he was elected by his countrymen governor of Scotland, in name of King John, whose title was still recognized.

In the following year Edward in person entered Scotland at the head of a numerous army. He was met at Falkirk (q.v.) by Wallace July 22; but the Scots, after an obstinate fight, were defeated. It is generally assumed that the jealousy of some Scottish nobles, who envied the position of the governor, had contributed to the disaster; and Wallace, in consequence, resigned his high office, retiring northward and continuing a predatory warfare against the English. Little is known of his later history, except that he continued to struggle for his country's independence and never made his submission to Edward. It is certain that he was for some time in France. The stories recounted in modern Lives of Wallace are mostly mere legends. At the close of his life Wallace emerges from this obscurity. When Edward offered pardon to the other Scottish leaders on certain terms, Wallace was excepted by name, and a price was set upon his head; if he chose to surrender, his life was to be at the king's mercy. In 1305 he was seized by some of his own countrymen (it is said) and delivered to Edward. He was carried to London and tried for treason. He denied the charge, asserting, with truth, that he had never been the vassal or subject of Edward; but his plea was disregarded. He was condemned; and the sentence of death was executed Aug. 23, with accompaniments of unusual barbarity. Wallace was truly a hero; with great physical strength and military prowess, he had also dauntless courage, an unwavering purpose, and a disinterested patriotism.

The chief authority for the Life of Wallace, as told by popular Scotch writers, is the poem of Henry the Minstrel, who lived nearly two centuries after his hero, and whose narrative is a series of picturesque impossibilities. The fullest modern account is by Tytler in *History of Scotland,* vol. I., and in vol. I. of *Scottish Worthies;* but Tytler is to a large extent *Blind Harry* over again, with judicious excisions. All that is really known of Wallace is in Burton's *History of Scotland:* it corroborates the most favorable estimate of Wallace's character.

WAL'LACE, William Harvey Lamb: soldier: 1821, July 8—1862, Apr. 10; b. Urbana, O. Having moved to Illinois with his family 1832, he entered an Illinois regiment at the opening of the war against Mexico, and took part in many of the principal engagements. He practiced law after his return to Illinois, and was district attorney 1853. He was commissioned colonel of the 11th Illinois infantry regiment 1861, and by his conduct at Fort Donelson 1862, Feb., won the rank of brigadier-general. At the battle of Shiloh he received a mortal wound after six hours of obstinate fighting.

WAL'LACE, William Vincent: British musician and operatic composer: 1814, June 1—1865, Oct. 12; b. Waterford; of Scotch parents. He early attained proficiency as a performer on the pianoforte and violin; and

was for some years leader of the orchestra of a Dublin theatre. He emigrated to Australia and gave concerts in Australia and New Zealand; and afterward in India and America. In 1845 he went to England and wrote his first opera, *Maritana,* which had immediate success with lovers of English opera, and still holds the stage. After again visiting America, Wallace composed *Lurline,* which was brought out in London 1860, with even greater success than *Maritana.* He produced other operas; and his works show musical culture and the power of brilliant orchestration. He died in s. France.

WALLA'CHIA, or WALA'CHIA. See ROUMANIA.

WALLACHS, n. plu. *wâl'lăks* [Ger. *wälsch;* AS. *wealh,* foreign—names given by Teutonic nations to foreigners and colonists, and countries inhabited by them]: the natives of Wallachia, the descendants of Roman and other colonists (see ROUMANIA; MOLDAVIA). WALLACHIAN, a. *wâl-lā'kĭ-ăn,* of or pertaining to: N. an inhabitant or the language of Wallachia. WALLACHIAN SHEEP, *Ovis aries,* a sheep remarkable for the development of its horns, which resemble those of the koodoo. The fleece is a soft woolly undercoat, covered with and protected by long drooping hair. This sheep is a native of w. Asia and e. Europe, and is common in Wallachia, Hungary, and Crete: it is sometimes called the Cretan sheep.

WALLACK, *wŏl'lăk,* JAMES WILLIAM: actor: 1794, Aug. 24—1864, Dec. 25; b. Lambeth, England; son of parents who were travelling comedians. He went on the stage in childhood at the Surrey Theatre, London; became stage-manager of Drury Lane Theatre, London, 1824. He first visited the United States 1818, and enacted the rôles of Macbeth, Romeo, Shylock, Coriolanus, Hamlet, and Richmond, with indifferent success. In comedy he was eminently successful, his best performances being in the principal rôles of *The Brigand, Rent-day, The Wonder, Don César de Bazan, Wild Oats.* He conducted a theatre in New York 1837, and for several years thereafter; presenting standard plays with well-trained companies. He managed Wallack's Lyceum in New York 1852-61, when he established the old Wallack's Theatre (now the Star Theatre).

WAL'LACK, JOHN LESTER: comedian: 1820, Jan. 1—1888, Sept. 6; b. New York; son of James William Wallack. He was educated in England; at the age of 20 entered the British army as lieutenant, but 2 years later adopted his father's calling, and made his first appearance on the theatrical stage in Dublin. He began an engagement in New York 1847, Sept. 27, playing the part of Sir Charles Coldstream in one of Boucicault's comedies. For several years thereafter he was employed in various New York theatres, and 1852 joined his father's company as actor and manager; at the elder Wallack's death, 1864, Lester Wallack succeeded to the proprietor-

ship, and conducted Wallack's Theatre till 1881. Then the new Wallack's Theatre was built, and was conducted by Wallack for some years. On his formal retirement from the stage, 1888, the players of America gave in his honor and for his benefit a performance of *Hamlet*, in which the rôles were enacted by the foremost histrionic artists of the United States: the 'benefit' amounted to $20,000 net.—Among the rôles in which Wallack was most successful were those of Don Felix in *The Wonder;* St. Pierre in *The Wife;* Alfred Evelyn in *Money;* Charles Surface in *The School for Scandal;* Young Marlowe in *She Stoops to Conquer;* Harry Dornton in *The Road to Ruin;* Claude Melnotte in *The Lady of Lyons.*

WALLAH, n. *wăl'lă* [Hind. *wala,* fellow, man]: a person; a fellow; a man. COMPETITION WALLAH, in *India,* a civil servant selected by competitive examination.

WALLASEY, England: an industrial town suburban to Liverpool, in Cheshire, 2 m. n.w. of Birkenhead, near the seaward extremity of the Wirral peninsula, protected by the notable Wallasey embankment. The town has a workingmen's institute, a 16th century reorganized grammar school, and is noted for its municipal ownership of public utilities, water, gas, electric-lighting, street railways, baths, cottage hospital, etc. Pop. (1901) 53,580.

WALLA WALLA, Wash.: city, county-seat of Walla Walla co., on the Walla Walla river, 28 m. e. of the Columbia river, and on branch lines of the Northern Pacific and the Union Pacific railroads; 150 m. s.w. of Spokane. A United States fort was established near the site of the city in 1857, and around this fort grew up a trading post and settlement; it was first called Steptoeville, but when the town was incorporated in 1859 the name of Walla Walla was adopted. It was first incorporated as a city in 1862, and received a second charter in 1884. The city is situated about 15 m. w. of the Blue Mountain range, at an altitude of 1,060 ft.; it is surrounded by the beautiful and fertile Walla Walla valley, over 100 m. in length, forming a part of the 'Inland Empire' between the Rocky and Cascade ranges, and consisting of a belt of agricultural land, the larger part under cultivation, which yields large crops of wheat, oats, and barley, as well as vegetables and fruits. In this valley the city of Walla Walla is the centre of trade, and it has become one of the most important commercial cities of the eastern part of the state. It contains an extensive plant for the manufacture of farm machinery and implements and other manufacturing establishments, including gas and electric power works, two flouring mills, and lumber mills; and has five banks, of which two are national banks. Among its notable public institutions are the United States land office, United States district court, an Odd Fellows' home for the state of Washington, the Stubblefield home for indigent widows and orphans, with $135,000 of perpetual endowment, and two hospitals.

Fort Walla Walla joins the city on the west, and 6 m. to the west is the monument to the memory of the martyred pioneer and patriot, Marcus Whitman. The city has an excellent supply of pure water from mountain streams, and a first-class system of waterworks owned and operated by the municipality. The government is vested in a mayor, elected annually, and a council of seven; the city officials are mostly elected by popular vote. Pop. (1900) 10,049; (1910) 19,364.

WALL-CREEPER: a small bird (*Tichodroma muraria*) of the European Alps, which frequents walls and perpendicular rocks in preference to trees, on whose rough trunks its relatives, the creepers (*Certhia*) make their living. It is about 6 in. long; plumage light gray, with bright crimson on the shoulders, the larger wing coverts, and the inner webs of the secondaries; the rest of the wings black; tail black, tipped with white. Called also spider-catcher.

WALLENSTEIN, (more correctly WALDENSTEIN), ALBRECHT WENZEL EUSEBIUS, VON: duke of Friedland and Mecklenburg, and Prince of Sagan: German soldier: b. Hermanic, Bohemia, 1583, Sept. 15; d. Eger, Bohemia, 1634, Feb. 25. He studied under the Jesuits at Olmütz, and after accepting the Catholic faith finished his studies at the universities of Altdorf, Bologna, and Padua. In 1717, on assisting the Archduke Ferdinand in the latter's war against Venice, he was raised to the rank of count and made a colonel. When Bohemia revolted, he raised a regiment of cuirassiers for the emperor and fought against Thurn and Bethlen Gabor. When the estates of the vanquished Bohemians were confiscated in 1620 and sold to imperial adherents at nominal prices, he purchased extensive tracts, including the domains of Friedland and Reichenberg. In 1623 he was made duke of Friedland, and in 1624 his collective estates were elevated to a principality. He now applied himself to the care of these dominions. When the emperor was involved in new troubles by the Lower Saxon league in 1625 he offered to raise 20,000 men for the imperial service by his own efforts. In return, he was to have full control in the hostile provinces. Before he had completed his levy he was named generalissimo and field-marshal, and then set out at the head of 30,000 men to co-operate with Tilly (q.v.). In 1625, April 25, he gained a victory over Count Mansfeld at Dessau, and when that general proceeded at the close of the year to Hungary to join Bethlen Gabor, he followed and brought Bethlen to conclude a truce. In the campaign of 1627 he conquered Silesia, drove the Danish king out of Germany, and forced his way into northern Jutland, bought from the emperor the dukedom of Sagan, at a price in which his military expenses were reckoned. The estates of Mecklenburg having been forfeited in the war, he was invested in them, first as security for his expenses, and afterwards as a regular fief

in 1629. The attempt to take Stralsund was wholly unsuccessful (1628). In 1630, owing to the jealousy of the nobles, Wallenstein was deprived of his command.

When Gustavus Adolphus invaded Germany, Wallenstein attempted to negotiate with him on his own account, but the distrust of the Swedish hero frustrating his intentions, he listened to the earnest entreaties of the emperor, and again took the field, having procured a formal capitulation securing to himself almost absolute power. After some partial successes he encountered the king of Sweden at Lützen 1632, Nov. 16, in which battle Wallenstein was defeated and Gustavus killed. After the death of the Swedish king he had reopened negotiations with the enemies of the emperor, by whose assistance he hoped to place himself at the head of affairs in Germany. The matter proceeded slowly, as his offers were received with much mistrust, especially by the German princes; he resumed hostilities to make his value felt, then reopened negotiations. His proceedings were known at the court of Vienna; but he was at the head of an army largely consisting of foreigners, many of whose leaders were personally pledged to him alone. The emperor was not strong enough to remove him, and was base enough to have recourse to assassination. On Jan. 24, 1634, he signed a secret patent conferring the command of the army on Count Gallas, who was instructed to arrest Wallenstein and his associates, and throw them into prison. On Feb. 18 an open proclamation was made commanding the army to obey only Generals Gallas, Piccolomini, and others named. Wallenstein left Pilsen with some of his confidential associates on the 23d to take refuge in the fortress of Eger, which he reached on the 24th. Here he was assassinated on the evening of the 25th. The plenipotentiary of Saxony and Brandenburg had reached Zwickau, and the plenipotentiary of France Frankfort, on their way to Wallenstein's headquarters, when they received word of his death. The emperor openly rewarded the assassins, among whom were two Scotchmen and two Irishmen, Gordon, Leslie, Butler, and Devereux. Wallenstein's overtures to the enemies of the empire have been represented by his partisans as *ruses de guerre*.

A vigorous controversy has been waged over the matter. As an organizer and leader of armies he must be ranked among the great commanders. In a time of excessive confusion he maintained a statesmanlike control of difficult affairs. His career was made the basis of Schiller's trilogy of *Wallenstein*. See THIRTY YEARS' WAR.

WALLER, EDMUND: English poet: b. Coleshill, Hertfordshire (now in Buckinghamshire), 1606, Mar. 3; d. Beaconsfield 1687, Oct. 21. He was educated at Eton and King's College, Cambridge, and is said to have been returned a member of parliament for Amersham in his

16th year. In 1625 he was returned for Chipping Wycombe, and he sat for other places in several parliaments, including the Long parliament. On the death of his wife in 1634 he courted Lady Dorothea Sydney, whom he celebrated in his verses under the name of *Sacharissa*, and Lady Sophia Murray, whom he distinguished by the name of *Amoret*, both without success. In parliament he at first opposed the court party, but retained his place in the Long parliament, and openly expressed his royalist sentiments after the civil war began. He was sent as a commissioner from parliament to the king after Edgehill, and soon after this occurred the incident called Waller's plot. Its nature is not clearly understood, though Waller made an abject confession of all he knew, including the names of his confederates, some of whom, his near relatives, were put to death. This event in his life is introduced in Beatrice Marshall's story, *An Old London Nosegay* (1904). He was imprisoned for a year, fined £10,000, and exiled. During this exile the first collection of his poems was published in 1645. In 1653 he obtained permission from Cromwell to return to England, and in 1654 he addressed a *Panegyric to the Lord Protector*. In 1656 he recommended him in another poem to assume the royal title. Shortly after a poem on the death of the lord-protector, he addressed one to the king on his majesty's happy return. The proceedings of Monk apparently had not been anticipated. He again sat in parliament, at intervals of cessation, till the reign of James II. Burnet says his popularity in parliament was great, but he did not take pains to understand its business, but only studied to gain applause, being a vain and empty, though a witty man. His poetry was celebrated for elegance and polish at a time when these graces had been comparatively little studied, but it is destitute of all great qualities.

WALLER, Frank: American artist and architect: b. New York 1842, June 12. He was educated at the Free Academy in New York, studied art in Rome (1870-71), and the next year made a sketching tour in Egypt. He was a founder and the first president of the Art Students' League and since 1888 has devoted his attention to architecture. Among his paintings may be cited *Tombs of the Caliphs* (1874); *A Caravan in the Desert* (1878); *Eventide: Venice* (1883); *Hop Picking* (1885). He published *Report on Art Schools* (1879).

WAL'LER, Thomas McDonald: politician: b. New York about 1840. Being an orphan newsboy in New York, he was adopted into the family of a resident of New London, Conn., and assumed the family name instead of his own surname Armstrong. He studied law, was admitted to the Connecticut bar 1861, and quickly reached high rank as an advocate. He was elected as democrat to the Connecticut legislature 1867-8, 1872, 76, and in his last term was speaker of the house. He was

Connecticut secretary of state 1870; mayor of New London 1873; state attorney 1876-83; governor 1882. He was United States consul-general at London 1885-89. He then returned to the practice of law in New London, and repeatedly refused to again hold office.

WALLET, n. *wŏl'lĕt* [according to Skeat, the same word as *wattle*, in the sense of a fleshy bag or excrescence]: a bag for carrying necessaries on a journey; a knapsack; anything protuberant and swagging.

WALLEY, *wŏl'lĭ*, JOHN: soldier: 1644-1712, Jan. 11; b. presumably in London, England. He commanded, 1689, Feb. 12, the first expedition against the French and Indians in Canada; and 1690, Aug., as lieutenant of Sir Wm. Phips, he sailed on a second expedition, landed at Quebec with 1,200 men, and, after a vigorous but unsuccessful bombardment of the place, returned to Boston. He was captain of the Ancient and Honorable Artillery Co. of Boston. His journal of his Canadian expeditions is in Thomas Hutchinson's *History of Massachusetts*.

WALL-EYE, n. *wawl'ī* [Icel. *vagl-eygr*, wall-eyed, said of a horse: Icel. *vagl*, a beam in the eye: Sw. *wagel*, a sty in the eyelid (and see EYE)]: an eye of a whitish color; the popular name of the disease of the eye called *Glaucoma* (q.v.). WALL-EYED, a. *-īd*, having an eye of a very light-gray or whitish color—generally applied to horses; hence, fierce or glaring.

WALL'FLOWER: plant of the genus *Cheiranthus*, nat. order *Cruciferæ*, having the siliques quadrangular from the prominence of the nerves on the back of the valves, seeds in a single row in each cell, stigma deeply 2-lobed, lobes bent back, flowers in racemes. The species are annual, biennial, or perennial herbaceous plants, some almost shrubs. The COMMON WALLFLOWER (*C. cheiri*) is found in rocky places and on old walls in s. Europe, also less abundantly in middle Europe and in Britain. It does not thrive so well in this country as in England, as it delights in a moist atmosphere. In its wild state its flowers are always yellow; but in cultivation they exhibit diversity of colors, chiefly brown, purple and variegated; and they attain a larger size. It is a universal favorite, for the delicious odor of its flowers, produced from Apr. to July. The varieties in cultivation are very numerous; but there are among them no marked distinctions. Double and semi-double flowers are frequent. The plant is perennial, but in gardens is generally treated as a biennial, though fine kinds are propagated by cuttings, which soon strike root under a hand-glass. The ordinary mode of cultivation is to sow the seed of an approved kind and to plant out the seedlings. The flowers of Wallflower have a bitter and cress-like taste, and were formerly used as medicine.—The Fairy Wallflower, Western Wallflower, etc., of some parts of the United States, are of a quite different genus, *Erysimum*.

WALLINGFORD, *wŏl'lĭng-fĕrd:* borough in New Haven co., Conn.; on the Quinnepiac river, and on the New York, New Haven & Hartford railroad; 12 m. n.n.e. of New Haven. It contains a town hall, high school, 4 churches, summer hotel, and manufactories of britannia and silver ware, machinery, and books. There are banks and a weekly newspaper. Pop. (1910) 8,690.

WALLINGFORD: Vt.; a town in Rutland co., on Otter creek and the Bennington & Rutland railway, 9 m. s. of Rutland, 59 m. s.w. of Montpelier, and about 11 m. s.w. of Killington Peak. Included in it are the villages of Wallingford, South Wallingford, and East Wallingford. It has 2 hotels, 4 churches, a public high-school, and manufactures of harness, tinware, coffins and caskets, and agricultural implements. Pop. (1910) 1,719.

WALLIS, John: English mathematician: b. Ashford, Kent, 1616, Nov. 23; d. Oxford, 1703, Oct. 28. He was educated at Emmanuel College, Cambridge, took holy orders, and in 1641 became chaplain to a Yorkshire baronet. He was one of the first members of the scientific association which became later the Royal Society, and in 1649 was appointed Savilian professor of geometry at Oxford. He was particularly skilful in the art of cryptography, or deciphering; and having by this means been enabled to render considerable service to the royal cause, he was on the Restoration of Charles II. made one of the royal chaplains. In 1661 he was one of the divines appointed to revise the Book of Common Prayer; and when the Royal Society was founded in 1663 his name was included in the list of the earliest members; and he added much to the reputation of that body by valuable contributions to the *Philosophical Transactions.* Among his mathematical works the most important are: *Arithmetica Infinitorum; Mathesis Universalis, sive Opus Arithmeticum; Mechanica, sive de Motu Tractatus geometricus; De Sectionibus Conicis Tractatus;* and his *Algebra.* He also published editions of Archimedes, Ptolemy, Aristarchus, and Porphyry. His complete works, including various treatises on theology, were published at Oxford (1692-9).

WALLIS, Sir Provo William Parry: English naval officer: b. Halifax, Nova Scotia, 1791, Apr. 12; d. Funtington, near Chichester, England, 1892, Feb. 13. He entered the British navy as a midshipman in 1804; served against the French, and in the war of 1812 with the United States was second lieutenant on the Shannon. He was on board this ship in the fight with the Chesapeake and upon the disablement of the captain and death of the lieutenant, Wallis took command and conducted the prize to Halifax, receiving promotion to commander in recognition of his services. He was aide-de-camp to the queen in 1847-51, and in the last named year was promoted rear-admiral. He became vice-admiral in 185.,

admiral of the white in 1863, and of the fleet in 1877. Contrary to the usual rule of retirement at the age of 70 Wallis was retained on the active list until his death, and for many years he was the only surviving flag-officer who had fought in the Napoleonic wars and in the war with America in 1812.

WALLIS, Severn Teackle: American lawyer: b. Baltimore, Md., 1816, Sept. 8; d. there, 1894, Apr. 11. He was graduated from Saint Mary's College, Baltimore, in 1832, and was admitted to the bar in 1837. He became corresponding member of the Royal Academy of History at Madrid in 1843, and in 1849 went to Spain as United States agent to examine the title to public lands in east Florida as affected by the treaty of 1819. He was elected to the Maryland legislature in 1861 and there took a firm stand against action of the North in regard to the civil war. He was imprisoned by the Federal government for 18 months together with other prominent Marylanders and then released. He resumed his law practice and in 1870 was elected provost of the University of Maryland. He published: *Glimpses of Spain* (1849); *A Discourse on the Life and Character of George Peabody* (1870); etc.

WALLIS ARCHIPELAGO: Pacific Ocean; a group of islands n.e. of Fiji, with an area of 40 sq.m. They were placed under a French protectorate in 1887, have a French resident, and are in regular communication with Nouméa. Pop. est. 4,500.

WALLKILL RIVER: a river taking its rise in Sussex co., N. J., and flowing n. and n.e. through Orange and Ulster counties, N. Y. About 6 m. from the Hudson it joins the Rondout creek, and below the junction the stream is sometimes called the Wallkill. The Wallkill is about 120 m. in length and furnishes considerable water-power.

WALLON, Henri Alexandre: French historian: b. Valenciennes, France, 1812, Dec. 23; d. 1904, Nov. 13. He was educated in the normal school at Paris, and in 1840 was appointed to the chair of modern history and geography at the Sorbonne. He was elected to the legislative assembly in 1849 but resigned in the following year; became a member of the national assembly in the year 1871; and in 1875-6 was minister of public instruction. The complete establishment of the republic was largely due to his amendment, the *Amendment Wallon*, carried 1875, Jan. 30, which subsequently gave him the sobriquet *Father of the Republic*. In 1876 he became a member of the senate. His writings include: *De l'Esclavage dans les Colonies* (1847); *Jeanne d'Arc* (2 vols., 1860); *La Vie de Jésus et son Nouvel Historien* (1864); *La Terreur, Etudes Critiques sur l'Histoire de la Révolution Français* (1872); *Les Représentants du Peuple en Mission*, etc. (1793-4; 5 vols., 1888-90); etc.

WALLOONS: the inhabitants of the Ardennes plateau, southern Belgium, who are chiefly of Celtic or Roman extraction, and speak the French language, in distinction to the northern inhabitants of German race and language. The name is probably analogous to that given by the Germans to other foreign races, as the Walachians, Gauls, Welsh, etc.

WALLOP, v. *wŏl'lŏp* [Norm. F. *vloper*, to thresh: Swiss, *valple*, to sway to and fro, to waddle: Low Ger. *wallen*, to boil: *gallop* is the same word]: to move to and fro, as the surface of water in a vessel that has been rapidly moved; to boil; to gallop; to give a beating to. WAL'LOPING, imp. WAL'LOPED, pp. *-lŏpt*. WAL'LOPER, n. *-ėr*, one who wallops.

WALLOW, v. *wŏl'lō* [akin to *wallop:* AS. *wealwian*, to roll: Dut. *wallen*, to boil, to bubble: Swiss, *wallen*, to roll: L. *volvĕrĕ*, to roll]: to roll one's body among mire or other filthy matter; to tumble and roll about in water; hence to live in a gross state, as in vice. WAL'LOWING, imp. WAL'LOWED, pp. *-lōd*. WAL'LOWER, n. *-ėr*, one who wallows.

WALL PAPER, or PAPER HANGINGS: called by the French *papier teint*, ornamental colored paper affixed to the walls of houses as a substitute for the ancient tapestry hangings. The Chinese appear to have employed paper for this use from time immemorial, and the English claim to have first introduced the practice into Europe. On the other hand, the French assert that printed paper hangings were first made at Rouen as early as 1620 or 1630 by one François, and that the art was perfected in the latter part of the 18th century by Reveillon in Paris. It has certainly prospered more in France than in any other country; and so much taste and skill have there been developed in the manufacture, that the French papers have been sought for in preference to all others. In Paris are numerous factories of paper hangings, employing more than 3,000 workmen; in Lyons are three establishments, and one each at Mulhouse, Strasburg, and Metz. Others are found in Belgium, Germany, Holland, England, and Russia. In the United States the first wall paper factory was established in 1790 by John B. Howell at Albany, N. Y. Paper was at that time made only in sheets, and had to be joined before being printed. Color was then applied by means of a brush to form the background of the design, and the latter was subsequently printed upon the paper from wooden blocks, as many blocks being used as there were colors in the pattern, each block having a part of the pattern upon it in one color. One block was printed the whole length of the paper before the next color was applied. It should be stated that this method of printing by means of blocks still prevails, but only in connection with designs which, on account of their dimensions, or through

some other peculiarity, cannot be printed on the cylinder-machines that have practically supplanted block or hand work, as it is termed. The method of applying color to the background by means of a hand-brush has, however, been done away with altogether. It does not appear that any other factories were established until after the year 1810, at which time a man named Boriken was engaged in the business. The Howell firm had meanwhile sold out their Albany business to Lemuel Steel, and, after a short experience in New York and Baltimore, had finally, in the year 1820, located at Philadelphia, Pa., where they have been established ever since, the present owners comprising the third and fourth generations engaged in the business. It was not, however, until 1844 that any decided advance was made in the growth of the industry. About that time paper in continuous lengths came into more general use, and the necessity of joining sheets together was obviated. In that year, also, the first machine for printing wall paper was imported from England and introduced into the Howell factory. While very crude, as it printed only a single color, it had a stimulating effect on the business, inasmuch as it enabled goods to be produced at a largely reduced price, and increased the volume of the business considerably. As near as can be ascertained, the entire production of wall paper in the United States at that time did not exceed $250,000. The second printing apparatus was imported from England in 1846, this one printing six colors. Machines were subsequently built in this country, at first by the machinists connected with wall paper factories, but after a time a specialty of this class of work was made by William Waldron, of New Brunswick, N. J.

The printing-machine of to-day is unquestionably a great improvement on that originally imported into this country, although the principle of its operation is practically the same. It is cylindrical in shape. The paper passes over the cylinder, the pattern being printed on it by means of rollers on which the design has been placed, each roller representing one of the colors used in the design. These rollers are registered so accurately that as the paper, in passing over the revolving cylinder, reaches one of them, it leaves the impression on the paper, and the succeeding rollers follow in regular order. The paper is hung up by an automatic process as it leaves the machine, and passes into drying-racks which are usually several hundred feet in length, after which it is rolled up in lengths of 8 to 16 yards, and is ready for market.

While the printing-machine is necessarily the most prominent feature of the business, yet other factors have contributed largely to the progress made by this industry. Among them are the grounding-machines, which furnish the background color to the paper; the bronzing-machines, which apply bronze powders to certain of the

goods; the embossing-machines, which give various textures to the goods after they have been printed; the pressing-machines, which are used to make goods showing the design in relief; the machine or contrivance that is used to hang up the paper after it leaves the printing-machine; and a host of similar devices that enable the manufacturer to produce novel effects and manufacture the goods more rapidly than before, and at a lessened expense. It is these contrivances that have led to the tremendous progress achieved by this industry in the last 60 years, and more particularly within the last 30 years (the pace having been accelerated each year), which have enabled us to become independent of foreign manufacturers, and, notwithstanding a reduction of duties on wall paper, have caused a continued falling off in imports, so that at the present time importations of wall paper are simply nominal.

The improvements were such as were called for by the exigencies of the moment, slight at the time, but cumulative, and enabling industry eventually to attain its present state of perfection. The most notable are as follows: (1) Soon after the introduction of the printing-machine one McKernan invented a contrivance for festooning the paper automatically as it leaves the printing-machine and passes on to the drying-racks. This was undoubtedly a long stride in the process of making wall paper, inasmuch as the speed of the printing-machine could be increased to the full capacity of the drying-racks connected with it. (2) The single (or continuous) process of making wall paper was introduced about the year 1870. Formerly the ground color had to be applied by one machine, after which the paper was dried and rolled up and next passed through the printing-machine to receive the impressions of the design thereon. In the continuous process the paper passes through the machine which applies a ground color for the design, and then passes through a drying apparatus that is termed a 'hot box,' or into drying racks, and then automatically passes into the printing-machine which applies the colors of the design, saving a double handling of the goods and involving less waste. (3) The method of applying bronze powders to wall paper automatically was introduced about the year 1872, although, as it was conducted in secret for some time by one or two firms, the discovery may have been made at an earlier date. This method reduced largely the cost of making bronze (otherwise termed gold) papers, and led to an increased demand and output of them. (4) The next and most recent discovery was the application to wall paper of bronze powders in a liquid state; that is, mixed with an adhesive material (made from potato-starch) of sufficient density to keep the bronze powders in solution without impairing their lustre. This was first placed upon the market about 1882, and as the new process enabled the use of as many dif-

ferent shades of bronze as there were colors in the design, the opportunity was afforded for producing many new and brilliant effects, and for superseding in a large measure bronze or gold goods made by the former method. While the mechanical part of the business has made vast strides, there is yet another feature that outranks it in importance, and that is the artistic element. The American people have a constant craving for something new, and the manufacturer is taxed to the full extent of his powers to satisfy this demand. On no industry does this demand fall more heavily than on wall paper manufacture, and by no occupation has the demand been more fully satisfied.

WALL'-PIECE: small cannon (or, in ancient times, an arquebus) mounted on a swivel, on the wall of a fortress, for firing at short range on assailants in the ditch or on the covert-way.

WALL'-TREES: fruit-trees trained on walls for better exposure of the fruit to sunshine, and for sake of the heat radiated from the wall. Brick walls are preferred; and have a great advantage in the regularity with which the nailing can be accomplished; but trees are often trained on stone walls also, and sometimes on the walls of houses. Trees are trained on walls in hot houses as well as in the open air. Flued walls are often used, the fruit being thus partially forced by artificial heat; and screens of various kinds, as of reeds, canvas, and oiled paper, are sometimes employed to protect blossoms in spring. Woolen nets also are much used for this purpose, and a net even with wide meshes affords much protection from spring frosts. Wall-trees intended to occupy the wall permanently are generally trained in the nursery with a dwarf stem only five or six inches in length, so that the branches may cover the whole wall, and no available part of it be lost. It is usual, however, in planting to introduce *riders* alternately with the permanent wall-tree: the riders are grafted or budded on tall stocks, and occupy part of the wall till the wall-trees have become large enough to require it all. The chief modes of training wall-trees are known as *fan training* and *horizontal training*. In fan training the branches are arranged like the spokes of a fan; in horizontal training a main stem is led up, from which they are spread out horizontally on both sides. Different modes are preferred for different kinds of trees, and the art of the gardener is shown in keeping to his plan of training, and *laying* in branches so as to fill the space and make every part of the wall productive. There is a Dutch mode of training, which consists in leading two chief branches horizontally right and left, and training shoots from them straight up to the top of the wall. Riders are trained frequently in a star-like form, some branches being led downward, to fill the wall as quickly as possible. It is necessary for the gardener, in training

wall-trees, to consider the habit of each kind, particularly whether fruit is to be expected chiefly on young branches or on the *spurs* of older branches. Superfluous branches must in all cases be carefully removed, and among these are to be reckoned all *fore-right shoots*, or branches which project straight from the wall.

WALNUT, n. *wawl'nŭt* [AS. *wealh*, foreign, and *hnut*, a nut: Dut. *walnoot*, a walnut: Icel. *valhnot;* Dan. *valnöd*]: tree of several species, native of Persia, whose wood is used in cabinet-work; also its nut. WALNUT-OIL, one of the oils used in painting, obtained from the fruit of the walnut.—The *Walnut* is a beautiful tree of the genus *Juglans*, nat. order *Juglandaceæ*. This order is nearly allied to *Cupuliferæ* (q.v.), but differs in having a solitary erect ovule. The flowers are unisexual, the male flowers in catkins, the female in terminal clusters. The species, of which not quite 30 are known, are natives mostly of North America; a few are found in Asia. All are trees with alternate pinnated leaves. The genus *Juglans* is distinguished by a drupe with a fibrous-fleshy indehiscent husk, and a deeply wrinkled shell (*putamen*) of two valves, within which is the seed, curiously lobed and wrinkled, with a membranaceous *testa* and partial dissepiments. The species of Hickory (q.v.) were formerly included in this genus.—The COMMON WALNUT (*J. regia*) is a native of Persia and the Himalaya, but has long been cultivated in all parts of s. Europe. The date of its introduction is unknown, but it was certainly cultivated by the Romans in the reign of Tiberius. It is a lofty tree of 60-90 ft., with large spreading branches. Its foliage resembles that of the ash. The leaves have 2-4 pair of leaflets and a terminal one. They have a fine balsamic odor when bruised; this quality, however, being much more marked in some trees than in others. Placed in wardrobes, they prevent the ravages of moths. The sap is limpid like water, but contains much sugar, so that the tree is sometimes tapped for it, like the sugar-maple, and the sugar is procured by evaporation. A pleasant kind of wine also is made from it. An excellent pickle and a kind of catchup are made of the unripe fruit. The ripe fruit is one of the best of nuts, and is an important article of export from many parts of s. Europe. Walnuts are exported in large quantities from Cashmere and other Himalayan regions to supply the markets of India. The outer husk is removed before the nuts are brought to market. In s. Europe, walnuts are a considerable article of food; and when perfectly fresh they are wholesome and nutritious, though in the state in which they are exported to other countries they are not easily digestible. Just before they are ripe they are much used in France with vinegar, salt, pepper, and shallots. Among varieties of walnuts in cultivation is one with a very thin shell, which is much esteemed.

Walnuts yield by expression a bland fixed oil, which, under the names *Walnut Oil* and *Nut Oil*, is much used by painters, and in the countries in which it is produced is a common article of food. The *cake* left after the expression of the oil is sometimes used as food, and is used also for feeding cattle and poultry. The timber of the walnut is of great value, and is much used by cabinet-makers. Gun-stocks are made of it. It is light, though hard and fine-grained. The wood of young trees is white and little esteemed; that of old trees is brown, veined and shaded with darker brown and black. The wood of the roots is beautifully veined. Both the root and the husks of the walnut yield a dye used for staining light-colored woods brown. The walnut, when meant to become a timber-tree, is best sown where it is to remain, as the roots are much injured by transplanting. The best kinds of walnuts for fruit are generally grafted.—The walnut was probably introduced into England by the Romans. It takes its name from being foreign [AS. *wealh* or *walk*].—Of late years it has been largely planted in California. Very similar to the Common Walnut is the Black Walnut (*J. nigra*) of North America, found in most parts of the United States, except the most northern. It abounded in the states of the Mississippi valley, but was recklessly cut down for every purpose—railway ties, common boards, and even cowsheds. Now it brings a high price for cabinet-work, and much is sent east and even exported. It is a very large and beautiful tree, the trunk sometimes 6 or 7 ft. in diameter. The leaves have more numerous leaflets than those of the Common Walnut. The fruit, however, is very inferior. The partial dissepiments of the kernel are thick and woody.—The Butternut (*J. cinerea*) is abundant in the n. and n.w. states of North America and in Canada. It is a tree about 50 ft. high, with trunk about 12 in. in diameter; leaves with 15-17 leaflets; the fruit elongated, and externally covered with a viscid substance. The nut is hard and rough, with prominent ridges; is of good quality, and sometimes brought to market. The wood is not apt to split or warp, and is useful for many purposes. Sugar is obtained from the sap, as from that of the maple, but it is of inferior quality. The inner bark is a mild cathartic, resembling rhubarb in its properties. The leaves, reduced to powder, are used for blistering, like cantharides.—To the nat. order *Juglandaceæ* belongs the genus *Engelhardtia*, found in the Malayan Archipelago and the Himalaya. The wood of *E. Roxburghiana*, a Himalayan species, is much valued by turners.

WALPOLE, *wŏl′pōl*, Horace, fourth Earl of Orford: 1717, Sept. 24—1797, Mar. 2; son of Sir Robert W., first Earl of Orford. There has been, among scandal-mongers of subsequent times, a different account of his parentage, but seemingly without evidence. He was educated at

Eton and Cambridge. After finishing his education, he travelled abroad for some years, principally in Italy, where he seems to have acquired those tastes for which he afterward became so well known. In 1741 he returned to England and took his seat in parliament. But he had no taste for politics, and never took active part in public life. In 1747 he purchased a piece of ground, with a villa, near Twickenham, on the banks of the Thames. Here he built his famous Gothic mansion—Strawberry Hill. Its erection and decoration formed one of the principal occupations of his long life. He made it a museum of every kind of curiosities. In 1758 he published his *Catalogue of Royal and Noble Authors.* This was followed by *The Castle of Otranto, The Mysterious Mother,* and the *Historic Doubts on the Life and Reign of Richard III.* The works, however, which preserve his name are his *Letters:* these will always be interesting as pictures and records of the society and fashionable gossip of his day, though their interest is marred by their palpable lack of truthfulness. On the death of his nephew, 1791, he became fourth Earl of Orford. 'The faults of Horace Walpole's head and heart,' says Macaulay, 'are indeed sufficiently glaring. His writings, it is true, rank as high among the delicacies of intellectual epicures as the Strasburg pie among the dishes described in the *Almanach des Gourmands.* But as the *pâté de foie gras* owes its excellence to the diseases of the wretched animal which furnishes it, and would be good for nothing if it were not made of livers preternaturally swollen, so none but an unhealthy and disorganized mind could have produced such literary luxuries as the works of Walpole. . . . The conformation of his mind was such that whatever was little seemed to him great, and whatever was great seemed to him little. Serious business was a trifle to him, and trifles were his serious business.'—See *Letters,* ed. by Cunningham (8 vols. 1857); Macaulay's Essay; *Horace Walpole and His World,* by L. B. Seeley (1883).

WAL'POLE, Sir Robert, Earl of Orford: prime minister of England: 1676, Aug. 26—1745, Mar. 18; b. Houghton, in Norfolk; son of Robert Walpole, M.P. He received his education at Eton and at King's College, Cambridge; 1700, July 30, he married Catharine, daughter of Sir John Shorter, lord mayor of London; and Nov. 28 he succeeded to the family estates on the death of his father. In 1702 he was elected member of parliament for King's Lynn; and 1705 he was nominated one of the council to Prince George of Denmark. In this latter capacity he appears to have won the esteem of Godolphin, Marlborough, and other whig leaders. In 1707 he was appointed secretary of war, and 1709 treasurer of the navy. Shortly after this, however, his fortunes suffered temporary eclipse. He was found guilty by the house of commons of 'a high breach of trust and

notorious corruption,' and accordingly, 1712, Jan. 17, he was expelled from the house, and sent to the Tower. There can be little doubt that he was not much troubled by scruples in regard to bribery; but his punishment on this occasion seems to have been the result of party animosity. Instead of working his loss of popular favor, it ultimately augmented it. He had all along been a strong Hanoverian, and on the accession of George I. he was restored to fortune. He was made a privy councilor, and had various other high offices conferred on him. On the impeachment of Bolingbroke and others by his means, he became, 1715, chancellor of the exchequer and first lord of the treasury. A disunion of the cabinet having arisen 1717, he resigned office, bringing in a sinking-fund bill on the day of his resignation. In opposition, he was the determined enemy of the South Sea Scheme. He was recalled to office on the retirement of the Earl of Sunderland 1721; and from this time to his final retirement 1742, the life of Walpole may be said to be the history of England. In 1723 his son was created Baron Walpole. In 1737 his power was much shaken by the disputes between the king and the Prince of Wales; the latter siding with the opposition, which began to grow very formidable in the questions which arose about this time between England and Spain. Walpole was opposed to war; the grand principle of his action being, according to Archdeacon Coxe, 'the love of peace;' according to Macaulay, however, his aim was the peace not of his country, but of his own administration. In 1740 a motion was made in the house to petition the king to remove Sir Robert Walpole 'from his majesty's presence and counsels forever.' This motion was negatived by a large majority; but the power of the great minister was evidently shaken. He resigned 1742, Feb. 2, and was created Earl of Orford, with a pension of £4,000 a year. Charges of bribery were now brought against him, and a committee of investigation was appointed by the house of commons, comprising 21 members, of whom only two were of his own party. The report was against him, but it was unsupported by evidence, and proceedings were ultimately dropped. The rest of Walpole's life was spent in retirement. In private life he was amiable and good-tempered. Love of power appears to have been his ruling motive of action. He had strong common sense, with clearness of political vision, and next to his own interest he had at heart the interest of his country. Doubtless he bribed largely, but, as Macaulay says, 'We might as well accuse the poor Lowland farmers who paid black-mail to Rob Roy of corrupting the virtue of the Highlanders, as accuse Sir Robert Walpole of corrupting the virtue of parliament.'—See Coxe, *Memoir of Sir Robert Walpole* (1798); Macaulay's Essay on *Walpole's Letters;* Ewald, *Sir Robert Walpole* (1877).

WALPOLE, Sir Spencer: English historian, son of Spencer Horatio Walpole (q.v.): b. England, 1839, Feb. 6; d. 1907, July 8. He was educated at Eton and entered the employ of the government as clerk in the war office in 1858. He became inspector of the fisheries in 1867, lieutenant-governor of the Isle of Man in 1882 and in 1893-9 was secretary to the post-office. He was knighted in 1898. He wrote *A History of England from 1815* (1878-86); *The Electorate and the Legislature* (1881); *Life of Sir John Russell* (1889); *The Land of Home Rule* (1903); etc.

WALPOLE, Spencer Horatio: English statesman: b. 1806, Sept. 11; d. London, 1898, May 22. He was educated at Trinity College, Cambridge, was called to the bar in 1831 and in 1846 became queen's counsel. He was home secretary in 1852 and in 1856-82 sat in Parliament for Cambridge University. He was again home secretary for a few months in 1858, and was an unofficial member of the cabinet in 1867-8. From 1887 until his death he was high steward of Cambridge University.

WALPOLE, Mass.: town in Norfolk co.; on the New York, New Haven & Hartford railroad; about 20 m. s.w. of Boston. It contains the village of South Walpole, Walpole, and East Walpole. It was settled in the 17th century, but was laid out as a town about 1720, and in 1724 was incorporated. The chief manufacturing establishments are a furniture factory, paper mill, and cotton factory. There are 8 churches, a high school, and 15 district schools.—Pop. (1910) 4,892.

WALPOLE, N. H.: town in Cheshire co.; on the Connecticut river, and on the Fitchburg railroad; about 4 m. below Bellows Falls and 19 m. n.w. of Keene. It is in an agricultural region, on a high bank which has an almost precipitous descent of several feet. The place was founded in 1745 on a site granted by Massachusetts in 1735, and in 1752 confirmed or re-granted by New Hampshire. There are six churches, a high school, several graded and district schools, and a public library which contains about 6,000 volumes. The bank has deposits amounting to nearly $300,000.—Pop. (1910) 2,668.

WALPURGA, Walburga, or Walpurgis, Saint: German abbess: b. England; d. 778. She was sister of Saint Willibald, first bishop of Eichstadt, in Germany, and niece of Saint Boniface, the apostle of the Germans. She went, like her uncle and brother, to Germany as a missionary, and became, about the middle of the 8th c., abbess of a convent at Heidenheim, in Franconia. Chapels were dedicated to her, relics of her were shown, and festivals celebrated in her honor. The feast of Walpurga falls properly on Feb. 25; but as in some German calendars it is assigned to May 1, the name of Walpurga has become associated, with some noted popular pagan superstitions. May-day was the time of a great pagan

sacrificial festival and of the old May assembly of the people.

WALPUR'GIS-NIGHT: the night preceding St. Walpurgis Day (May 1), on which, according to the old popular superstition among the Germans, witches rode on broomsticks and he-goats to an appointed rendezvous at the old places of pagan sacrifice—notably the Brocken or highest peak of the Harz Mountains—there to enjoy themselves with their master the devil at the great pagan festival of May-day. See BELTEIN: also Goethe's *Faust*.

WAL'RUS, or MORSE, or SEA-HORSE: amphibious mammal of the genus *Trichœcus* and family *Phocidæ*, agreeing with the rest of that family—the seals—in the general form of the body and limbs, but widely differing from them all in the head, which is remarkable for enormous development of the canine teeth of the upper jaw, and the tumid appearance of the muzzle caused by the magnitude of their sockets and by the thickness of the upper lip. These great canine teeth form two tusks directed downward, and the lower jaw becomes narrow in front, so as to pass between them. The nostrils, as if displaced by the sockets of the tusks, open almost upward, at some distance from the muzzle. The eyes are small; and the ears have no auricle, or, in popular language, there is no ear.—There is (as usually classified) only one known species (*T. rosmarus*), sometimes called the ARCTIC WALRUS, inhabitant of Arctic seas and of colder parts of the n. temperate zone. The walrus of the n. Pacific is by some writers made a distinct species, *T. obesus*. The walrus sometimes attains a size greater than that of the largest ox; and the tusks are sometimes 24 in., or even 30 in. long, but their ordinary length is only about 12 in. The walrus is gregarious, and is often seen in great herds, which sometimes leave the water to rest on the ice or on the land, where, however, their movements are very awkward and clumsy, and the hunter assails them with ease; though when hundreds are together the adventure is not without danger, as they must be assailed with spears, their hide being thick enough to resist a rifle-bullet. The walrus uses its tusks for protecting itself or young from attack, for combating with its enemy the polar-bear, for aiding it in climbing upon ice; but principally, it is supposed, for tearing seaweed from submarine rocks, and for digging mollusks, crustaceans, etc., from the sand. The female walrus has great affection for her young, and will defend it to the last extremity; the young also remains beside the mother even after she is killed. When one of these animals is attacked, the rest of the herd—at least if in the water—hasten to its assistance. The walrus is very capable of being tamed.—It is much sought by the inhabitants of the most northern parts of the world for its skin, thongs of which seem to have been generally used in former times for ropes and cables—esteemed so valuable that

the Finlanders paid tribute in this article; while its oil —not very abundant—is employed like seal-oil; and the tusks are valued as ivory, though inferior to those of the elephant. The flesh is coarse, but is an important food of the Esquimaux. The young walrus has not large tusks like the adult.

The name Morse is from the Russian *Morss* or Lapp *Morsk*. The name *Walrus* is Norwegian [*Hval-ros*, whale-horse]. Another Norwegian name is *Rosmar*, supposed to be from the Teutonic *ros*, horse, and *mar*, the sea.

WALSALL, *wawl'sawl:* municipal and parliamentary borough, Staffordshire, England; on an affluent of the Tame; 8 m. n.n.w. of Birmingham, 123 m. n.w. of London. Its public buildings are accounted more than usually handsome, and include a number of churches; a free grammar school, founded 1554 for educating the boys of the town in classics; the Blue-Coat School; several board schools; and a number of charitable institutions. The iron manufacture, for which the situation of the town on the edge of the s. Staffordshire mineral field affords facilities, is the staple industry. Tanning, currying, and manufacture of harness and harness furniture and of all kinds of leather goods, are extensively carried on. Coal and lime works are in operation in the vicinity, and there is extensive trade in malt. Pop. 87,000.

WALSH, *wŏlsh*, Robert, ll.d.: author: 1784-1859, Feb. 7; b. Baltimore, Md. He was educated at St. Mary's, Baltimore, and Georgetown College, D. C. After a protracted tour in Europe, he began the practice of law in Philadelphia 1810. He founded, 1811, the first American quarterly review—the *Amer. Review of History and Politics;* was editor of the *Amer. Register* 1817-8, and of the *National Gazette* 1819-36. The *Amer. Review* having died at the close of its second year, Walsh resuscitated it 1827, and conducted it with much ability till 1836. He resided in Paris from 1836 till his death, and was United States consul there 1845-51. Besides his editorial labors on the periodicals above named, Walsh performed a great amount of other editorial work, and was author of numerous books; he was, besides, a frequent correspondent of the *National Intelligencer* and the *Journal of Commerce.* Among his own writings are: *Essay on the Future State of Europe* (1813); *Didactics: Social, Literary, and Political* (2 vols., 1836).

WALSH, William, d.d.: archbishop: b. Dublin, Ireland, 1841. He was educated at the Catholic University of Ireland and at Maynooth College, and after graduating at Maynooth spent 3 years on the Dunboyne establishment in post-graduate theological studies. He became professor of theology at Maynooth 1867; vice-president 1878; president 1880, chosen by unanimous voice of the Irish bishops. Before the parliamentary 'Bessborough Commission,' 1869-70, Walsh as proctor for the bishops

and tenants conducted their case against the Duke of Leinster, landlord, with great skill and discretion: his acts in this investigation had much influence in determining the tenor of the Land Act of 1881. At the death of Cardinal McCabe, the clergy chose Walsh vicar-capitular; they also named him to Rome for archbishop of Dublin. The British cabinet had a different sort of candidate for the place, and the pope's choice coincided with that of the cabinet; but the people and clergy of Dublin and Ireland prevailed. Walsh is considered by the Irish the first archbishop of Dublin since the death of St. Lawrence O'Toole, who has been free from the taint of 'Castle influence.' He testified before the Parnell Special Parliamentary Commission 1888-9, and did much to discredit Richard Pigott, the perjured witness of the London *Times* and the British government, 1888-9. He has been active in questions of popular education, trade strikes, and temperance. He has written much for reviews, and has published many books—e.g., *De Actibus Humanis*, a treatise on one branch of moral theology; *Harmony of the Gospel Narrative of the Passion; Liturgical Music of the Mass of the Dead; Grammar of the Gregorian Music.* On questions of secular concern he has published *A Plain Exposition of the Land Act of 1881; Addresses*, on various subjects; *Addresses on the Irish University Question; Statement of the Chief Grievances of the Catholics of Ireland in the Matter of Education;* etc.

WALSINGHAM, *wŏl'sĭng-am*, Sir FRANCIS: English statesman: about 1536-90, Apr. 6; b. Chiselhurst, Kent; of ancient Kentish family. He studied at King's College, Cambridge, and afterward traveled on the continent, where he remained until the accession of Queen Elizabeth. Burleigh, with his usual discernment in selecting men of talent, discovered his abilities, brought him into office, and sent him on an embassy to France 1570, Aug. He remained in Paris until 1573, Apr.; and discharged diplomatic duties with such consummate skill that he was, on recommendation of his great patron, appointed one of the principal secretaries of state to Elizabeth. He was also sworn of the privy council, and knighted. In 1578 he was sent on an important embassy to the Netherlands; 1581 to France, in connection with negotiations for toleration of the Huguenots; and 1583 to Scotland. He was, with some reason, regarded by the adherents of Mary, Queen of Scots, as the most insidious of her enemies in the English council. He contrived to intercept most of her letters, and after having deciphered them sent them to their destination, in order to obtain fresh intelligence from their answers: some of these deciphered letters are preserved in the British Museum. Walsh soon held Mary secure in the toils. Some time previous to 1583, Sept., he had bribed to his service Cherelles, secretary to the French ambassador Castelnau, in whom Mary placed implicit confidence. Walsh also won over Gray, envoy of

the Duke of Guise, and other friends of Mary, to James VI. (James I. of England), who employed Gray to manage his correspondence with his mother and his friends in France. The most secret letters of Mary and of James thus came into Walsh's hands. Until Babington's conspiracy there was no evidence for charging Mary with being accessory to any of the plots formed against the life of Elizabeth. Through spies in the pay of Walsingham, all the correspondence of Mary and her friends passed into his hands. After the discovery and execution of Babington, etc., Walsingham went to Fotheringay as one of the commission to try Queen Mary. She charged him with having forged her correspondence with Babington produced against her as proving her complicity in the plot to assassinate Elizabeth; when Walsingham rose in his place and solemnly called God to witness that he 'had done nothing unbecoming an honest man.' Elizabeth signed her death-warrant with a jest on Walsingham's hatred of the Queen of Scots. The accusation that Walsingham brought Mary to the block by forging her letters can scarcely be maintained on her mere denial of the letters; inasmuch as in that denial she denied also all knowledge of the Babington conspiracy, whereas Mendoza the Spanish ambassador had written to Philip II. that Mary, while the plot was in progress, had informed him that she had full acquaintance with it.—Walsingham was distinguished even among the ministers of Elizabeth for acuteness of penetration, extensive knowledge of public affairs, and profound acquaintance with human nature. His administration of foreign affairs involved extensive use of bribery and espionage: he is said to have had in his pay 53 agents and 18 spies, in various countries; and no minister in Europe was better informed of the many intrigues of foreign courts. Notwithstanding this diplomatic duplicity, which was then universal among public men, Walsingham's personal integrity and distinterested patriotism are undoubted. He was a patron of learning, was of strict morals, favored the Puritan party, and in his later days was much given to religious meditation. He retired from public affairs some time before his death, and resided at his house in Barn Elms, where he died. Elizabeth, though acknowledging his diligence, genius, and important services, yet kept him poor. His plainness of speech as her adviser, and his Puritan tendency, were not according to her taste. There remain in the British Museum (Harleian MSS.) various letters from Walsingham complaining of his being wholly unable on his scanty appointments, to support his establishment, though very inadequate to his dignity of ambassador in France. He had become surety for the debts of his son-in-law Sir Philip Sidney; and after Sidney's death a flaw in the legal documents involved Walsingham in financial ruin. Camden says he died so far in debt that he was buried privately by night in St. Paul's

Church, without any funeral solemnity. The queen was chary even in conferring honors on him, for he received nothing but his knighthood, and held no offices when he resigned the charge of foreign affairs. He was married; and his daughter Frances became successively the wife of Sir Philip Sidney, of the brilliant and unfortunate Earl of Essex, and of the brave soldier Richard de Burgh, 4th Earl of Clanricarde.

WALTER, *wawl'tėr,* JOHN: printer: 1739-1812, Nov. 12; b. England. He was a printer in London, and purchased the patent-rights in an invention designed to simplify the work of type-setting. The system was tried, but not with very favorable results, in the composing-room of a newspaper, the London *Daily Universal Register.* For the use of his patent-rights Walter obtained an interest in the *Register,* and thus laid the foundation of a great fortune; for later the *Daily Universal Register* became the London *Times.*

WAL'TER, JOHN: publisher: 1784-1847, Nov. 27; son of John Walter. He became manager of the London *Times* (q.v.) 1803, and by adopting many improved processes in printing-presses was able to meet the rising demand for the *Times.* He introduced into the *Times* office steam-power 1814, Nov. 27—the first employment of steam for practical work in printing. Walter accumulated a large fortune, and built and endowed a church near his country-seat in Berkshire.

WAL'TER, JOHN: publisher: 1818, Oct. 8—1894, Nov. 3; b. London; grandson of the founder of the *Times.* He was educated at Oxford, and was called to the bar 1847; was in parliament as liberal conservative 1847-65 and 1868-85. His conduct of the *Times*—though successful on the whole—was not in all respects characterized by the wisdom and shrewdness which marked the *régime* of his father and grandfather. The *Times* was mulcted in substantial damages and had to pay enormous law costs for having become the dupe of an Irish perjurer. The third John Walter erected a new office for the *Times,* and for himself a magnificent house in the suburbs of London.

WAL'TER, THOMAS USTICK, D.C.L., LL.D.: architect: 1804, Sept. 4—1887, Oct. 30; b. Philadelphia. He entered the office of William Strickland, architect of the U. S. mint at Philadelphia, 1819, and two years later, having acquired knowledge of linear drawing, and some acquaintance with the practice of architects, devoted himself for seven years to liberal studies; he then returned to the architect's office for two years, after which he began practice as an architect on his own account. Among his works in Philadelphia are the Moyamensing prison and Girard College building. He constructed for the government of Venezuela a breakwater at La Guayra. In Washington, D. C., he designed extensions of many public buildings.

WAL'TERBORO: S. C.; town, county-seat of Colleton co.; on the Charleston & Savannah railroad (Plant System), about 29 m. w. of Charleston. It is in an agricultural region, in which cotton is one of the chief products. It has cotton mills, lumber mills, naval stores, lumber yards, and large store houses. The two banks have a capital of $35,000. Pop. 1,600.

WALTERS, William Thompson: American merchant and art collector: b. on the Juniata river, Pa., 1820, May 23; d. Baltimore, Md., 1894, Nov. 22. He was educated to be a civil engineer, but became interested in the coal and iron industry, and while in charge of a smelting establishment in Pennsylvania produced the first iron manufactured from mineral coal in the United States. He removed to Baltimore in 1841, and established himself as a wine merchant there in 1847. He was president of the first steamship line between Baltimore and Savannah and was one of the reorganizers of the Southern lines. In 1861-5 he resided in Europe, where he traveled widely in the interest of art, and purchased numerous additions for his collection. He was United States commissioner at the Paris expositions of 1867 and 1878, and also to that at Vienna in 1873. He was a trustee of the Corcoran Art Gallery at Washington, D. C., and of the Peabody Institute. His private collection was one of the largest and most valuable in the United States, and his annual exhibit of his gallery for charity netted $30,000 for the poor of Baltimore. He wrote: *Barye* (1885); *Notes Upon Certain Masters of the 19th Century* (1886); etc.

WALTHALL, *wŏl'thal*, Edward Cary: American soldier: b. Richmond, Va., 1831, Apr. 4; d. Washington, D. C., 1898, Apr. 21. Admitted to the bar in 1852, he began practice in Coffeeville, Miss., and was district attorney for the 10th judicial district of Mississippi 1856-61. He then entered the Confederate army as lieutenant, becoming brigadier-general in 1862, Dec., and major-general in 1864, June. He especially distinguished himself at the battle of Missionary Ridge, where he led his brigade over a ridge and held back the Federal troops till the Confederate army made its escape; and he covered the retreat of General Hood's army after the defeat at Nashville. He practised law in Grenada, Miss., 1871-85, when he was appointed a United States senator to fill out the unexpired term of Lucius Q. C. Lamar. He was elected for full terms in 1888 and in 1892 was chairman of the committee on military affairs, and served on the committees on the improvement of the Mississippi river and on public lands.

WALTHAM: Mass.; city in Middlesex co.; on the Charles river, and on the Boston & Maine railroad; 10 m. w. of Boston. It is connected by electric railway with Boston, Newton, and many of the places in the vicinity.

The chief manufacturing establishments are the two

watch-making works. At the American Waltham Watch Works the first successful attempt was made to manufacture watch movements, on a large scale, by machinery. It is now the largest watch factory of its kind in the world. In 1814 a cotton mill was erected here, the first in the United States, in which, under the same roof, the raw material was put through all necessary forms, even through the bleachery and the dye works, and came out the finished cotton cloth of the market. Other manufactories are saddlery and harness works, foundry and machine shops, wagon and carriage factories, emery wheel works, lumber mills, furniture factories, and men's clothing factories. In 1900 (government census) Waltham had 275 industrial establishments—employing 5,392 persons, to whom was paid annually $2,630,929. The cost of the materials used each year was $2,317,792, and the plants were capitalized for $9,152,169. The value of the annual products was $6,934,381.

The principal public buildings are the government building, the municipal buildings, banks, churches, and schools. There is one large park and a number of small squares. The waterworks are owned and operated by the city. The main business streets and many of those in the residential sections are paved. The roads leading to the near-by villages and towns are well made and kept in good repair. The pure water, favorable climate, and good sewerage make the place most healthful.

There are 15 churches representing 10 different denominations. The educational institutions are the Massachusetts School for the Feeble-Minded, the Waltham Nurses' Training School, the Notre Dame Normal Training School, a public high school, and two private schools doing high school work: Saint Mary's School (R. C.) and Waltham New Church School (New Jerusalem Church). There are several commercial schools and Mellor's Commercial College, public and parish graded elementary schools, public evening schools, several private schools, a public library which contains about 30,000 volumes, and several school libraries.

There are two banks, one national and one state bank. The national bank has a capital of $150,000; and the two banks have deposits amounting to $4,183,990, the state bank alone has deposits of $3,459,990. The surplus and profits are $296,970.

Waltham was settled by farmers in the early days of the colony. The first incorporation was that of Watertown, which then embraced the territory now included in Waltham. In 1738 Waltham was set off from Watertown and incorporated as a town; and in 1884 it was granted a city charter. Pop. (1910) 27,834.

WALTHER, Karl Ferdinand Wilhelm, D.D.: 1811, Oct. 25—1887, May 7; b. Langenchursdorf, Saxony: Lutheran minister and author. He was for a time pastor at Braunsdorf, Saxony. He emigrated to America with a

large colony of his countrymen 1839, and settled in Perry co., Mo. He became pastor in St. Louis 1841. He founded and edited *Der Lutheraner* and a German theological journal entitled *Lehre und Wehre.* He was a leader in the extreme Lutheran confessionalism, or strict adherence to the dogmatical standard, and was colloquially termed 'the Lutheran pope.' He organized in 1846 the Missouri Synod, which was the germ of the Synodical Conference. He was professor in the Lutheran Theological Seminary at St. Louis from 1850 until his death. He was charged with holding Calvinistic principles, which he denied, and with which his doctrine of universal redemption would be quite inconsistent. He published a number of theological works in German; numerous sermons; and *American Lutheran Pastoral Theology* (1872).

WALTHER VON DER VOGELWEIDE, *wâl'tėr fōn dĕr fō'ghėl-vī'dėh:* greatest and most famous Minnesinger (q.v.) of the middle ages: b. between 1165 and 70, in Franconia or in Austria; d. about 1230. Although his family was noble, he had no possessions, and became a minstrel as much perhaps from necessity as from impulse. His master and early model was the elder Reinmar. It is thought that his first public performances in 'singing and saying' date from about 1187; soon after which he found a warm patron in Friedrich the Catholic, Duke of Austria. But this prince having died 1198, Walther von der Vogelweide began the life of a wandering minstrel, visiting the courts of most of the German sovereigns. A few details of his career are known. He twice (1199 and 1205) spent some time at the court of Emperor Philipp; and then lived six years at Eisenach with a generous patron, Hermann, Landgraf of Thuringia. During 1214-15 he repeatedly visited Emperor Otho, by whom, as well as by Philipp, he seems to have been treated with unkingly parsimony. From 1217 to 19 he lived with Duke Bernhard in Carinthia, then returned to Austria; and 1220 received from Frederick II. a small estate at Würzburg. His grave has long been pointed out in the Laurence Garden of the cathedral of Würzburg; but a new monument was erected to him 1843. Walther von der Vogelweide far excelled his master Reinmar, whom he survived about 20 years, both in matter and style; while in richness and versatility of mind all the other Minnesingers are far behind him; for to his wide sympathies and matured art all themes were alike: tenderness and depth no less than cheerfulness and gayety, deep earnestness as well as playful raillery. He did not confine himself, like Reinmar, to minnelays, but wrote also hymns, eulogies of his patrons, and didactic pieces. He sang of the duties and dignities of the emperor; of the obligations of princes and vassals; of the rights and wrongs of the question between the pope and the emperor; of the glory of the true church; and often his song conveyed earnest and cutting censure. But it was

only on conviction that he gave praise or blame, never influenced by favor or prejudice; and his censures of the church were those of a candid but pious believer. From a decided patriotic feeling, he stood firmly by the empire and the emperor in opposing the pretensions and usurpations of the pope. His writings on this subject had a widespread and powerful effect; they alienated, according to the testimony of a contemporary, Thomasin, thousands from the pope, and determined the politics, so to speak, of the German poets for the whole century. Walther von der Vogelweide was soon recognized by his contemporaries as the master of lyric poetry; and the traditions of the later Minnesinger schools place him among the 12 who, in Emperor Otho the Great's time, originated and established the art of minstrelsy. Lachmann brought out a masterly critical edition of Walther von der Vogelweide's writings (Berl. 1827, 3d ed. 1853), and Simrock an excellent translation (with explanations by Simrock and Wackernagel, 2 vols. Berl. 1833, 2d ed. Leip. 1853); Uhland wrote a beautiful account of his life and writings (*Walther von der Vogelweide, ein altdeutscher Dichter,* Stuttg. and Tüb. 1822), and Hornig a complete *Glossarium* to his poems (Quedlinb. 1844).—See Reuss, *Walther von der Vogelweide* (1843); Daffis (1854), Opel (1860), Rieger (1863), Kurz (1863), and Menzel (1865).

WALTON, *wawl'ton,* Brian, d.d.: English bishop, and editor of the *London Polyglot* (q.v.): 1600-1661, Nov. 29; b. Cleveland, Yorkshire. He was educated at Cambridge, graduating at Peterhouse 1619. In 1626 he became rector of St. Martin's Orgar, in London, and 10 years later rector of Sandon, in Essex, a prebend of St. Paul's, and chaplain to the king. In 1641 he became involved in the troubles of the time, and articles were brought against him in parliament; he was stripped of his preferments, and ordered into custody as a delinquent. In the retirement which now became necessary, Walton planned, and with the help of some of the ablest scholars of the country prepared, the great 'London Polyglot' Bible (1657, 6 vols. folio)—the first book ever published in England by subscription (see Polyglot). At the restoration 1660, Walton again became chaplain to the king, and was consecrated bishop of Chester. He died in London. Walton was also the author of *Introductio ad Lectionem Linguarum Orientalium* (1654); and *The Considerator Considered* (1659), an answer to the *Considerations* of Owen on the *Polyglot.*

WAL'TON, George: jurist: 1740-1804, Feb. 2; b. Frederick co., Va. He acquired an education amid great discouragements in early life; and after serving an apprenticeship in carpentry, studied law and began practice in Augusta, Ga., 1774. When the colonies were nearing the point of conflict with England, Walton was active in awakening the people to a sense of their rights and addressed public meetings assembled to consider the state

of affairs. He was one of the four signers of a call for such a meeting in Savannah 1774, July. He was delegate to the continental congress 1776, Feb.—1781, Oct., and signed the Declaration of Independence. When Savannah was captured by the British 1778, Dec., Walton, who as colonel commanded a militia battalion, was severely wounded and was held prisoner till 1779, Sept. Then he was elected governor of Georgia; he was governor again 1789. He was appointed chief-justice of Georgia 1783; and 1795-6 was United States senator. He was repeatedly elected to the state legislature.

WALTON, *wawl'ton*, IZAAK: author of *The Complcat Angler:* 1593, Aug. 9—1683, Dec. 15; b. Stafford, Eng.; son of one Jervis Walton, a yeoman. Of his earlier life little is known. In 1624 we find him settled in Fleet street, London, as a hosier. In the end of 1626 he married Rachel Floud, descendant of Abp. Cranmer. From George Cranmer, her uncle, who had been a pupil and friend of Hooker, it is thought likely that Walton derived much of the material for his Life of that eminent man. She died (1640, Aug.) in giving birth to a daughter, having had two sons, neither of whom survived her. In 1643 Walton retired from business with such a modest competence as sufficed for his simple way of life; and 1647 he married Anne Ken, half-sister of Bishop Ken. She died 1662, to the great grief of her husband, who survived her many years. He died at the age of 90, in the house of Dr. Hawkins, his son-in-law, prebendary of Winchester Cathedral, and was buried in the vault of that sanctuary.

Walton's first literary work was the 'Life of the Author' prefixed to Donne's *Sermons* (1640). This was followed by Lives of Hooker, Sir Henry Wotton, and George Herbert, in succession; the four being reissued in a collected edition 1670. In 1678 the Life of his friend Bishop Sanderson was added. *The Compleat Angler, or Contemplative Man's Recreation,* was published 1653. A *fac-simile* of the original edition was published 1875, and from first to last more than 50 editions have appeared. To the edition of 1676 a little treatise on Fly-fishing was added by Walton's friend Charles Cotton, in whose fishing-house, on the banks of the river Dove, many later years of Walton's happy and blameless life lapsed peacefully in his favorite recreation, and in his loving biographies of his eminent clerical friends. *The Compleat Angler,* as a treatise on the art of angling, is obsolete; but it continues to be read for its charming simplicity of manner, its pastoral freshness and poetry, and the pure, peaceful, and pious spirit breathed from its quaint old pages. The Lives, though somewhat less widely known, are in their kind not less exquisite.

WALTON: N. Y.; village in Delaware co.; on the New York, Ontario & Western railroad; about 175 m. n.w. of

New York, and 18 m. s.w. of Delphi. It is in an agricultural and dairy region, and the industries are connected with farm and dairy products. It has a foundry, machine shops, novelty works, and furniture factory. There are eight churches, a high school, graded elementary schools, and a school library. There is one national bank capitalized for $50,000, with deposits amounting to $450,000. Pop. (1900) 2,811; (1910) 3,103.

WALTZ, n. *wawlts* [Ger. *walzer*, a waltz; *walzen*, to roll]: the name of the national dance of Germany, probably of Bohemian origin, introduced into other countries as a fashionable dance about the end of the 18th c., and now in great vogue everywhere. It is danced by two persons who whirl round on an axis of their own and at the same time move quickly in a circle; the kind of music, usually written in ¾ time, which accompanies the dance: V. to dance a waltz. WALTZ'ING, imp.: N. the act or practice of dancing a waltz or in the waltz. WALTZED, pp. *wawltst*. WALTZ'ER, n. *-ėr*, one who waltzes.—The *Trois-temps Waltz* is the regular form, but some time ago the *Valse à Deux Temps*, containing six steps to every two of the trois-temps waltz, was generally adopted. It is not so graceful as the older one, because not so correspondent to the rhythm of the music, and has now given place to the *Valse à Trois Temps*.

WALWORTH, *wŏl'wėrth*, REUBEN HYDE, LL.D.: jurist: 1788, Oct. 26—1867, Nov. 27; b. Bozrah, Conn.; son of Benjamin Walworth, a revolutionary soldier descended from Wm. Walworth, who settled on Fisher's Island, N. Y., 1671. Walworth was a school-teacher at the age of 16 years, began to practice law 1809, and settling in Plattsburg, N. Y., quickly attained high rank as a lawyer; was appointed county judge 1811; was representative in congress 1821-23; judge of the 4th N. Y. judicial district 1823-28; chancellor of the state 1828-48, when the court of chancery was abolished. He fixed his residence at Saratoga 1833, and there for many years he met in council many of the foremost political men and jurists of his day—De Witt Clinton, Van Buren, Wm. M. Marcy, Wm. H. Seward, Stephen A. Douglas, James Buchanan, Chancellor Kent, Judge Story, Washington Irving, Fenimore Cooper, etc. In the office of chancellor Walworth formulated rules of practice and procedure that vastly simplified the work of the court and made riddance of many needless antiquated forms. Judge Story said that Walworth was the 'greatest equity jurist living' in his day. He published *Hyde Genealogy* (2 vols. 1864).

WAMBLE, v. *wŏm'bl* [Dan. *vamle*, to be disturbed with nausea]: in *OE.*, to move or stir, as the bowels do with wind; to roll with nausea and sickness: N. in *OE.*, a squeamish feeling; squeamishness. WAM'BLING, imp. *-blĭng:* ADJ. rolling or rumbling, as with sickness or hunger. WAM'BLED, pp. *-bld*.

WAME, n. *wām* [AS. *wamb*, the belly: Dut. *wam*, the belly of a fish]: in *Scot.*, the belly.

WAMPUM, n. *wŏm'pŭm* [Indian—from *wompi*, white]: small beads made of shells, used by the North American Indians as money, and also wrought into belts and ornaments.

WAN, a. *wŏn* [AS. *wann*, dark, livid: W. *gwan*, weak, feeble: Gael. *fann*, faint, feeble: L. *vānus*, empty]: pale, as with sickness; pallid; sallow; dark, gloomy, black—applied to water, the weather, etc.: V. in *verse*, to make wan; to become pallid. WAN'LY, ad. *-lĭ*. WAN'NESS, n. *-nĕs*, a sallow pale color. WAN'NISH, a. *-nĭsh*, of a pale color.

WANAMAKER, *wân'a-mā-kėr*, JOHN: merchant: born 1837, July 11, in Philadelphia co., Penn.; of German and Huguenot ancestry. He settled with his parents in Indiana 1856, but the next year returned to Philadelphia. While learning the business of clothier, he published and edited in Philadelphia *Everybody's Journal;* became salaried secretary of the Young Men's Christian Associations of the United States, and executive officer of the local Y. M. C. A. Association of Philadelphia 1859; afterward was president of the Philadelphia association. He embarked in commercial business 1861. In 1868 he founded Bethany College, with its preparatory and training schools. The present immense dry-goods, clothing, and miscellaneous business establishment of John Wanamaker & Co., of which he is head, was founded 1876. He became postmaster-general of the United States in the administration of President Benjamin Harrison 1889, and brought to his duties his great organizing and executive talent—giving great advance in all branches of the service. At the time of his appointment the annual sales of the commercial establishment amounted to $25,000,000. In 1896 he occupied the A. T. Stewart store in New York, between 9th and 10th streets, on Broadway.

WAND, n. *wŏnd* [Dan. *vaand;* Icel. *vöndr*, a shoot of a tree, a rod]: a long thin stick; a twig; a staff of authority; a rod used by conjurors and diviners.

WANDER, v. *wŏn'dėr* [Ger. *wandern, wandeln*, to wander, to travel: Dut. *wandelen*, to roam about (see also WEND)]: to move above without a settled course; to ramble; to travel here and there; to go astray; to depart from the subject under discussion; to be delirious; to stray morally, as from the path of duty. WAN'DERING, imp.: ADJ. moving about without a settled course; rambling; nomadic; roving, unsettled; disordered in mind: N. a travelling without a settled course; a journey hither and thither; a deviation or digression; a straying away from the right course or from one's home, etc.; the roving of the mind or thoughts; mental disorder; uncertainty. WAN'DERED, pp.

-dėrd. WAN'DERER, n. *-dėr-ėr,* one who wanders. WAN'DERINGLY, ad. *-lĭ.*—SYN. of 'wander': to roam; range; rove; stroll; gad; straggle; stray; err: swerve; depart; deviate.

WAN'DERING JEW. See JEW, THE WANDERING.

WANDEROO', or WANDERU: a large monkey (*Macacus silenus*) of southern India, especially the country bordering the Malabar coast. The wanderoos have long, slim bodies, covered with black hair, and tufted tails. The head looks very large, because of a mane, or ruff, and beard, which sticks out around the face, and is either gray or white, enhancing the sly look of the broad face, dull eyes, and broad muzzle.

The name is also given generally to monkeys of the genus *Semnopithecus. S. ursinus* is the great wanderoo of Ceylon, and Eastern zoologists think the term should be restricted to this species alone.

WANDSWORTH: London, England, a metropolitan and parliamentary borough on the south side of the Thames; area 9,130 acres. Wandsworth proper is situated close to the Thames, near the mouth of its small tributary, the Wandle, and is built between and on the slopes of two hills. New Wandsworth, a suburb of recent growth, lies to the east and south of both stretches of Wandsworth Common, beside which are the Surrey county prison, the county lunatic asylum, etc. There are many important industrial establishments.—Pop. (1901) 232,034.

WANE, n. *wān* [Goth. *vans,* wanting: AS. *wan,* deficient, wanting: Icel. *vanr,* wanting: perhaps connected with WAN, which see]: to decrease; to be diminished; to fail; to sink; opposed to *wax:* N. diminution; decrease; decline. WA'NING, imp.: ADJ. decreasing, as the moon; declining. WANED, pp. *wānd.*

WANGAN, n. *wŏng'an* [Amer. Indian]: a name applied in Maine to a lumberer's boat for carrying provisions, tools, etc.

WANGHEE, n. *wăng'hē:* an eastern cane, the *Phyllostachys nigra,* ord. *Graminācĕæ,* used in making walking-sticks, chairs, etc.; also spelled WHANGEE, *whăng'ē.*

WANG SHIH-FU: Chinese dramatic poet. He lived in the 13th century, was the creator of the Chinese opera *Thsa-Khi,* and composed 13 plays, of which only two survive. The *Hsi Hsiang Chi,* or *Story of the Western Pavilion*—like all Chinese plays, a sort of novel in dialogue—is his best work and obtained and still holds great popularity with the Chinese. It has been called by Giles 'of all plays of the Mongol dynasty, the one which will best repay reading.' The other is the comedy *The State Minister's Feast.* The former was partly translated into French by Stanislas Julien, the eminent French sinologue, in *Europe Littéraire.*

WANION, or WANNION, n. *wăn'yŭn* [probably from *wane,* implying ill luck: OE. *in the waniand,* at the waning of the moon]: in *OE.,* a hard blow; detriment. WITH A WANION, with a vengeance; implying a curse.

WANNESS, WANNISH. See under WAN.

WANT, n. *wŏnt* [AS. *wan,* deficient: Icel. *vanta,* to be wanting or deficient in (see also WANE)]: the lack or absence of that which is necessary or useful; state of not having; deficiency; necessity; poverty: V. to be without; to be destitute of; to be deficient; to fall short of; to need; to fail; to desire; to wish for; to long for. WANT'ING, imp.: ADJ. absent; deficient. WANT'ED, pp. —SYN. of 'want, n.': need; lack; penury; indigence; deficiency; defect; failure; destitution; scarceness; scarcity; dearth.

WANTON, a. *wŏn'tŏn* [AS. *wan,* deficient (see WAN), and *togen,* drawn or led, educated, pp. of *teón,* to draw, to educate: OE. *towen,* bred—properly signifying uneducated, ill brought up]: ill brought up; undisciplined; unrestrained; loose; indulging the natural appetites; disposed to lewdness; running to excess; reckless; lively or sportive, as 'the *wanton* wind'; quick and irregular motion; in *OE.,* luxurious; superfluous; not regular: N. a lascivious man or woman; a woman inclined to lewdness; a strumpet; in *OE.,* a spoiled child; a trifler: V. to play or revel without restraint; to behave with lewdness; to revel; to move nimbly and irregularly. WAN'TONING, imp. WAN'TONED, pp. *-tŏnd.* WAN'TONLY, ad. *-lĭ,* lewdly; without restraint; loosely; sportively; playfully. WAN'TONNESS, n. *-nĕs,* lewdness; lasciviousness; licentiousness; sportiveness; frolic.—SYN. of 'wanton, a.': skittish; frisky; lecherous; lascivious; libidinous; sportive; frolicsome; airy; coltish; lustful; licentious; dissolute.

WANT-WIT, n. *wŏnt'wĭt* [*want,* and *wit*]: in *OE.,* a fool; an idiot.

WAPACUT, n. *wŏp'a-kŭt* [N. Amer. Indian name]: the snowy owl.

WAPAKONETA, *wä'pa-kŏn-ĕt'a,* O., village, county-seat of Auglaize co.; on the Auglaize river, and on the Cincinnati, Hamilton & Dayton railroad; about 30 m. n. of Piqua and 13 m. s. by w. of Lima. It is in an agricultural region and in the natural gas and petroleum belt. The place was visited by whites in the early part of the 19th century, and some settlements were made. It was laid out as a village in 1833. Where the village now stands was the site of an Indian village of importance, the meeting place of certain tribes. In 1831 it was the scene of the signing of the treaty whereby the Shawnees and Senecas relinquished their lands to the government. Wapakoneta was the last place in Ohio occupied by the Indians. The chief manufactories are furniture, wheels,

machinery, and furnishings for dairies, and a machine shop. There are several banks.—Pop. (1910) 5,349.

WAPATOO, or WAPPATOO, n. *wŏp'a-tô,* or WAPPATO, n. *wŏp'a-tō:* name given by the Indians of Oregon to *Sagittaria littoralis,* a species of arrowhead, the tuber of which they eat.

WAPELLO, Iowa: town, county-seat of Louisa co.; on the Iowa River, and on the Burlington, Cedar Rapids & Northern railroad; about 31 m. n. of Burlington, and 20 m. south of Muscatine. It is in a rich agricultural region in which the principal products are wheat, corn, vegetables, and fruit. Considerable attention is given to stock-raising. The manufacturing establishments are flour and lumber mills, fruit and vegetable canneries, agricultural implement shops, and creameries. The town makes large shipments of grain, canned goods, hay, and live stock. There are two banks, one state and one private.—Pop. 1,500.

WAPENSHAW. See WAPINSCHAW.

WAPENTAKE, n. *wā'pn-tāk,* or WA'PENTAC, n. *-tăk* [AS. *wæpentac*—from *wæpen,* a weapon; Eng. *take*]: a division of certain English counties, nearly coinciding with *hundred*—so called because the inhabitants within such divisions, assembled for public purposes, *touched* the *weapon* of a new chief in sign of continued loyalty. *Wapentake* is obsolete except in Yorkshire.

WAPINSCHAW, or WAPENSHAW, n. *wăp'ĭn-shaw* [AS. *wæpen,* a weapon; *sceawian,* to view, to look at—*lit.,* a *weapon-show*]: a review of persons under arms, formerly made at certain times in every district of Scotland. The name is now familiarly applied to a gathering of the volunteer corps of a district for purposes of inspection, for shooting, etc.—The *Wapinschaw,* or periodical gathering of the people for the purpose of exhibiting their arms, was ordained by various Scots statutes of the 15th and 16th centuries, which directed each individual to be armed on a scale proportioned to his property. In the time of war or rebellion, proclamations were issued charging all sheriffs and magistrates of burghs to direct the attendants of the respective wapinschawings to join the king's host. During the reign of the later Stuarts, attendance on the wapinschaws was enforced with considerable strictness; and in addition to military exercises, sports and pastimes were carried on by authority at these gatherings. The Covenanters, disapproving of the sports at these gatherings, did what they could to discourage attendance.

WAPITI, n. *wŏp'ĭ-tĭ* [Indian name]: the North Amer. elk, *Cervus Canadensis,* nearly allied to the stag, but considerably exceeding it in size, being 4½ ft. in height at the shoulder. It is a native of North America, found as far s. as North Carolina, and as far n. as 56° or 57° n.

upper parts, grayish in winter; the sides gray; a pale yellowish patch on each buttock, bounded by a black line on the thigh; the neck, a mixture of red and black, with long, coarse, black hair falling down from it in front like a dewlap; a black mark at each angle of the mouth. The hair is crisp and hard, but there is a soft down beneath it. The antlers are large, much like those of the stag, but the first branch bends down almost over the face. The Wapiti is called *Elk* and *Gray Moose* in some places, though very different from the true elk or moose-deer. Its haunts are chiefly in low grounds, or in parts of the forest adjacent to savannas and marshes. Its flesh is coarse and dry. The hide makes excellent leather.

WAPPENED, a. *wŏp'pnd* [origin and meaning uncertain]: in *OE.*, perhaps wavering; hesitating. WAPPERED, a. *wŏp'pĕrd,* restless; fatigued.

WAPPERS, GUSTAV, Baron: Belgian painter: b. Antwerp, 1803, Aug. 23; d. Paris 1874, Dec. 6. Educated at the Art Academy of his native city under Van Bree and Herreyns, he went to Paris and devoted himself to copying the masterpieces of the Venetian School and subsequently studied the style of Rubens, Jordaens and the Flemish painters. He made the first great hit in 1830 by a large picture representing the *Burgomaster Van der* lat., but is now becoming rare. It is chestnut-red on the *Werf of Leyden in the Spanish Siege.* Wappers surrounded himself with a number of young painters and under the enthusiasm he kindled a new school of Belgian painting came into existence. In 1832 he was appointed professor and eight years later director of the Art Academy of Antwerp; from 1846 to 1853 he was president of the Belgium National Museum and in 1847 was ennobled. Among his principal pictures are *The People of Brussels Tearing up the Proclamation of Prince Frederick* (1835, in the Museum at Brussels); *The Entombment* (1836, in Saint Michael's Church, Louvain); *The Madonna in Clouds Surrounded by Angels; Charles IX. Shooting Down the Huguenots;* etc.

WAPPINGER ('the east'), a confederacy of the Algonquian stock of North American Indians formerly occupying the territory extending eastward from Hudson River, between the neighborhood of Poughkeepsie and Manhattan Island in New York to the valley of Connecticut River in Connecticut. They were closely related to the Mohicans, and by most authorities are regarded as having been a part of them. The Hudson River tribes became involved in war with the Dutch colonists in 1640, which continued for five years, the Indians losing 1,600 of their number and the Wappingers being the chief sufferers. The survivors retained their tribal customs until 1756, and continued to occupy a tract in Westchester county, when most of them joined

the Nanticokes, then living under Iroquois protection at Chenango, near Binghamton, N. Y., and finally became merged with the Delawares. Some of them also joined the Moravian and Stockbridge Indians, while a few still resided in Dutchess county just before the American Revolution.

WAPPINGER FALLS, N. Y.: village, Dutchess co.; on Wappinger Creek, about 2½ m. from its mouth at New Hamburg, and 7 m. s. of Poughkeepsie. The name of the village is that of a tribe of Indians who once inhabited this section. The creek here falls over a series of high ledges which form picturesque cascades, and also furnish water power for several manufactories. The chief industrial establishments are print-works, established in 1834; overall and sheeting factory, machine shop, grist mill, and creameries. The village has a union school, public and parish elementary schools, and a school library. There is one state bank.—Pop. (1910) 3,195.

WAR, n. *wawr* [OF. *werre;* F. *guerre;* It. *guerra,* war—from OGH. *werra,* vexation, strife: O. Dut. *werre,* strife, war: Ger. *wirren,* to entangle, to embroil]: an armed contest between nations or states (*international war*), or between different factions or parties in the same state or nation (*civil war*); a contest carried on by force of arms; open hostility; the profession of arms; opposition or contest of any kind carried on between two parties; in *OE.,* forces; army: V. to attack a state with force of arms; to carry on hostilities; to contend; to strive with violence; in *OE.,* to make war upon. WAR'RING, imp. WARRED, pp. *wawrd.* WAR'FARE, n. *-fär* [*war,* and *fare*]: the carrying on of war; contest or struggle. WAR'LIKE, a. *-līk* [*war,* and *like*]: fit or disposed for war; soldierly; belonging to war. WARRIOR, n. *wawr'yėr,* one engaged in war; a soldier. WAR'RIORESS, n. *-ĕs,* in *OE.,* a woman soldier. CIVIL, or INTESTINE WAR, a war carried on between parties belonging to the same state. WAR'CRY, a national or party cry or shout made in charging the enemy in battle; a party watchword or principle of action. *War-cries* for mutual recognition and encouragement in battle have always been common, each rude nation or tribe having its own. The ancient war-cry of the English was *Saint George!*—of the Spaniards, *San Jago!*—that of the French, *Mountjoie Saint Denis!* In the feuds of the middle ages, each party, or the retainers of each noble family, had a distinctive war-cry. Sometimes the war-cry was the name of the family. Thus, in Scotland, the retainers of the noble houses of Douglas and of Home rushed into battle with the cry of *A Douglas! a Douglas!* or *A Home! a Home!* The French armies under Napoleon were accustomed to charge with shouts of *Vive l'Empereur!* WAR DEPARTMENT, that division of the executive government of a country which controls all matters connected with

the army. In the United States this department is in charge of the *secretary of war* (see SECRETARIES OF EXECUTIVE DEPARTMENTS, in the United States Government: MINISTRY, in Executive Government). WAR-OFFICE, the department of a state in which its military affairs are managed. WAR-WHOOP, n. *-hwôp*, the yell uttered by savages in advancing to battle. WAR'-WORN, a. *wōrn*, impaired or enfeebled by war. MAN-OF-WAR, a ship armed and equipped for attack or defense. ON THE WAR-PATH, said of Amer. Indians when engaged in a hostile foray.—*War* between states or nations, or between parties in the same state, is analogous to club-law, or the law of the strongest, among the individuals of a community, which is the normal state of things where no legal or fixed rights are established or where there is no authority to enforce them.

Wars are various in their occasions and objects, breaking out sometimes in consequence of disputes about territorial possessions or material interests, at other times having reference to the establishment of some important point of civil or religious liberty. At one time the art of war was supposed to consist very much in wearing out the enemy by a slow process of exhaustion, and thus wars were much protracted; but more recently the greatest generals have rather endeavored to strike sudden and terrible blows, by which the war is sooner ended; and this method, though often adopted with no considerations of humanity, is probably less productive of suffering to mankind than the other.

Among rude nations wars are conducted by tumultuary hosts, suddenly congregated, and in general, after either defeat or victory, soon dispersed. But the wars of the more civilized and powerful nations have long been conducted by armies carefully trained and disciplined; and in the case of maritime powers, by fleets at sea as well as armies on land. Preparation for war among such nations requires not only the forming and training of the army, but vast provisions in many various ways of the means and *matériel* of war. Great science and skill are applied to the conduct of military operations, and the principles on which they ought to be conducted have been carefully investigated, and theories tested by an examination of the history of the most important campaigns. See STRATEGY: TACTICS.

The invention of gunpowder has effected great changes in the whole art of war; but the introduction of firearms has rendered battles less sanguinary and ferocious than they previously were. While firearms were yet unknown, warlike engines of various kinds were employed; but close combat was more general, and often more protracted, and the passions of the combatants had thus in ordinary battle more of that exasperation which fearfully characterizes the storming of a town.

In the progress of society, certain *usages of war* have

come to be generally recognized. These have greatly varied at different times and in different countries; but the changes in them have been in general favorable to the interests of humanity. Prisoners of war are no longer put to death, nor are they reduced to slavery, as was frequent in ancient times; and their treatment has become increasingly mild and kind. It is a well-understood rule, however, that a prisoner of war obtaining his liberty by exchange or otherwise, with the condition of not serving again during a fixed period against the same power, forfeits his life if he is found so serving and is again taken prisoner. Among all civilized nations, quarter is granted in battle whenever it is sought; and there are certain usages universally prevalent with regard to the capitulation of fortified places, and of bodies of troops hopelessly hemmed in by superior forces. The persistent disregard of any principle of law by a belligerent would annihilate it as a principle of international law, and as the belligerent has already set the power of its immediate antagonist at defiance, the only considerations which can enforce its observance of an international law are its own respect for its principle, or its fear of the power of neutrals. In like manner national law is opposed to and limits civil war. In as far as either party sets the national law at defiance the law is abrogated and can only be re-established by force; in as far as it is observed it controls the action of both parties. Private war is opposed by natural law because there is no positive law recognized by the parties. Violence is limited only by the power or conscience of the belligerents.

LIST OF NOTABLE WARS.

AFGHAN WARS: (1) War waged in Afghanistan by Great Britain in support of the claims of Shûja Khan to the throne, 1838, Oct. 1—1840, Nov. 4 (see AFGHANISTAN). (2) War which ensued on the refusal of Shere Ali to receive a British mission, 1878-9. (3) Military operations in which Great Britain punished the massacre of the British resident at Cabul, Sir Louis Cavaguari and his staff, 1879-80. See AFGHANISTAN.

ANGLO-BOER WARS, 1876—1903. See SOUTH AFRICAN REPUBLIC; SOUTH AFRICAN WAR.

AUSTRO-PRUSSIAN WAR: war waged by Prussia and some of the smaller states against Austria, Saxony, Hanover, etc., 1866, June—Aug. 12; sometimes called the *Seven Days' War* and the *Seven Weeks' War*, because of its short duration. See GERMANY.

BROAD-SEAL WAR: contest which arose in the United States house of representatives, 1839, Dec., over the admission or exclusion of five whigs from New Jersey, whose right to seats, though certified by the broad-seal of New Jersey, was denied by the democrats.

BUCKSHOT WAR: contest, 1838, Dec., in the Pennsylvania house of representatives, between rival whig and

democratic organizations, each of which claimed to be *the* house; so called from a whig threat that 'buckshot' would be used.

CHINESE-JAPANESE WAR, 1894-5. See CHINESE EMPIRE.

CIVIL WAR: any armed contest between parties in the same state or country. Specifically, (1) in English history, the war waged by the parliamentary army against Charles I., and the subsequent struggles till the Restoration, 1660 (see ENGLAND)—*History*. (2) In United States history, the war of secession, 1861-65. See UNITED STATES OF AMERICA; CIVIL WAR.

CORINTHIAN WAR: war waged against the Spartans, B.C. 395-387, by Corinth, Argos, Thessaly, and Thebes, and ended by the peace of Antalcidas; so called because hostilities were carried on for the most part near Corinth (q.v.), or in Corinthian territory.

CRIMEAN WAR (q.v.), 1853-56.

FRANCO-GERMAN WAR (q.v.), 1870-1.

FRENCH AND INDIAN WAR, 1754-63. See FRENCH WAR (or OLD FRENCH WAR).

HUNDRED YEARS' WAR: series of wars between England and France, 1338-1453, which ended in the expulsion of the English from France, except from Calais (q.v.), which they retained for a century more.

INEXPIABLE WAR: rebellion of the mercenaries at Carthage (q.v.) at the end of the first Punic war, B.C. 241, and the military operations by which it was suppressed under Hamilcar, B.C. 238.

ITALIAN WAR: war waged by Sardinia and France against Austria 1859, Apr.—July 11, resulting in the cession of Lombardy to Sardinia, and the formation of the kingdom of Italy, 1860, Mar. 18. See ITALY.

JUGURTHINE WAR: war waged by the Roman republic against Jugurtha, King of Numidia, B.C. 111. See JUGURTHA.

KING GEORGE'S WAR: American phase of the war of the Austrian succession, 1741-48, in which Great Britain and her colonies in America waged war against France and her Indian allies. See SUCCESSION WARS.

KING PHILIP'S WAR: war between the colonists of New England and the confederated Indians under King Philip, sachem of Pokanoket, 1675-6. See PHILIP, KING.

KING WILLIAM'S WAR: war waged by Great Britain and her colonies in America against France and her Indian allies 1689-97.

LATIN WAR: war between Rome and the Latin League, B.C. 340-338, ending in the defeat of the latter. See LATIUM.

MARSIC or MARSIAN WAR. See SOCIAL WAR.

MEXICAN WAR, 1846-48. See MEXICO; UNITED STATES OF AMERICA: MEXICAN WAR.

MITHRIDATIC WARS. See MITHRIDATES.

NAPOLEONIC WARS: wars waged by Napoleon (q.v.).

Opium War: war waged by Great Britain against China 1840-42, in consequence of Commissioner Lin's demand that all the opium in the hands of British subjects at Canton should be given up without compensation to the native authorities. The war resulted in the cession of Hong-Kong to the British, the payment of an indemnity of $21,000,000, and the opening of four new ports to foreign trade—viz., Amoy, Foochow, Ningpo, and Shanghai. See Chinese Empire.

Peasants' War. See Peasant War.

Peloponnesian War. See Peloponnesus; Greece.

Peninsular War: war, 1808-14, in Spain and Portugal against the French; chiefly under Sir Arthur Wellesley (afterward Duke of Wellington). The French were driven out of the Peninsula 1814, Apr. 5.

Pequot War, about 1637. See Pequots.

Persian Wars: wars between Persia and Greece, b.c. 5th c. See Marathon; Thermopylæ; Salamis; Greece.

Potato War, 1777-79. See Succession Wars.

Punic Wars: three great wars between Rome and Carthage (q.v.), b.c. 264-146.

Queen Anne's War: war waged by Great Britain and her colonies in America against France and her Indian allies, 1701-13.

Revolutionary War. See United States of America.

Russo-Japanese War, 1904 (q.v.).

Russo-Turkish Wars. See Russia.

Saltpetre War: war between Chili and Peru (aided by Bolivia) 1879-83, for possession of certain guano and nitre beds. See Bolivia; Chili; Peru.

Samian War: war between the Samians and Athenians under Pericles (q.v.), about b.c. 440.

Samnite Wars: three wars waged by the Romans against the Samnites (q.v.) and other Italian peoples: (1) b.c. 343-341; (2) b.c. 326-304; (3) b.c. 298-290. See Caudine Forks; Rome.

War of the Gladiators: contest between the Roman power and Spartacus, b.c. 73-71; so called because Spartacus, in retaliation for the cruelties of the Romans to the Gladiators, made a number of his Roman captives fight as gladiators around the funeral-pile of one of his commanders.

War of the Lovers: war waged against Henry III. of France at the instance of the ladies of the Navarrese court, who incited their lovers to take up arms against 'the discourteous sovereign, as the enemy of womankind,' because for political reasons he had disclosed to Henry of Navarre the amour of his wife with the Viscount of Turenne: 1580, Apr. 15—Nov. 26.

War of the Rebellion: the war of secession. See United States of America; Civil War.

Wars of the Roses. See Roses, Wars of the.

Wars of Wartburg. See Wartburg, War of the.

WARBECK, *wawr'bĕk*, Perkin: pretender to the

crown of England: b. London, though said to have been son of a Jew of Tournay, where he spent his boyhood; d. 1499, Nov. 23. In 1490 he appeared at the court of the Duchess of Burgundy, sister of Edward IV. of England; and professed to be the Duke of York, younger of the two sons of Edward IV., murdered in the Tower. In 1492 he landed at Cork, where he was welcomed. Subsequently he was received as Duke of York at the court of Charles VIII. of France; and from the court of Burgundy, where he was treated as nephew of the duchess, he went to Kent and attempted a rising against Henry VII. He next went to Scotland, where James IV. gave him the daughter of the Earl of Huntly in marriage. In 1498 he came to Cornwall, took the title of Richard IV. of England, was taken prisoner, escaped from prison, was retaken, was detected in a plot, and put to death at Tyburn.

WARBLE, v. *wawr'bl* [OF. *werbler,* to speak quickly and distinctly—from OHG. *hwerban,* to set in movement: Ger. *wirbeln,* to whirl, to warble]: to purl or gurgle, as a brook; to chirp or sing, as birds; to quaver any sound; to sing in a quavering or trilling way; to utter musically; in *OE.,* to cause to quaver: N. a quavering modulation of the voice; a song, as of a bird. WAR'BLING, imp. *-blĭng:* N. the act of shaking or modulating notes; singing. WAR'BLINGLY, ad. in a quavering or trilling way. WAR'BLED, pp. *-bld.* WAR'BLER, n. *-blẽr,* one who sings; a songster.

WARBLE, n. *wawr'bl* [etym. doubt.]: in *farriery,* one of those small, hard tumors on the backs of horses occasioned by the heat of the saddle in traveling, or by the uneasiness of its situation; also a small tumor produced by the larvæ of the gad-fly on the backs of horses, cattle, etc.

WAR'BLER: popular name often applied to all the birds of the family *Sylviadæ* (q.v.), many of which, however, commonly receive other popular names, as the Blackcap, Nightingale, Hedge-sparrow, Redbreast, Redstart, Stone-chat, Wheat-ear, Whitethroat, etc. (q.v.), while many receive the name Warbler with some adjunct. Several species thus designated belong to the genus *Salicaria,* others to the genus *Sylvia.* The species of the former genus have the tail rounded; in the latter, it is almost square or a little forked. The *Salicariæ* are inhabitants of moist situations, whence they are known as *Sedge Warblers* and *Reed Warblers;* the *Sylviæ* are inhabitants of woods. Of the former genus is the Grasshopper Warbler (*Salicaria locustella*), frequent in Great Britain. It is found in most parts of Europe, at least during summer, being partially a bird of passage. It is of greenish-brown color, the centers of the feathers dark brown, producing a spotted appearance; the lower parts pale brown. It receives its name from its chirping, grasshopper-like note.—The Sedge Warbler (*Salicaria*

phragmitis) is found usually in thick patches of reeds or willows in marshes. It is of brown color, with various shades finely intermixed; chin and throat white; under-parts buff color.—The Reed Warbler (*Salicaria arundinacea*) is found in many parts of Europe, and its range extends to n. India. It is of uniform pale brown, with tinge of chestnut; chin and throat white; under-parts pale buff color. Its nest is attached to the stems of three or four reeds, and formed by winding the branches of their panicles together with a little wool; and is conical and deep, so that the eggs or young may not be shaken out when the reeds are shaken by the wind.—The Wood Warbler, known also as Wood Wren (*Sylvia sylvicola*), is common in wooded districts of England; it is olive green, tinged with yellow; wings brown; feathers edged with bright yellow; lower parts yellow and white. —The Willow Warbler (*Sylvia trochilus*) frequents woods, but builds its nest on the ground. It is of dull olive-green color; wing and tail feathers dark brown, wing-feathers edged with green; under-parts whitish, tinged with yellow. There are other British species more rare.—Of this family, Old World Warblers, which are like diminutive thrushes, are the Golden-crowned and Ruby-crowned Kinglets (*Regulus*) of North America, not uncommon; and the Blue-gray Gnat-catcher (*Polioptila*), pure ashy blue, whitish below, the male with forehead and sides of crown black; it is chiefly southern, but ranges to Massachusetts and Michigan.

The New World Warblers, *Mniotiltidæ*, have very numerous and beautiful species, seen in the n. states mostly in secluded woods, and many of them for only a short time while in transit, spring and autumn. Those most often seen are the Tennessee Warbler (common west), olive green, head ashy; the Nashville Warbler, similar, but bright yellow below, the male with partly concealed crown-patch of bright chestnut; the Summer Warbler, golden yellow, the breast and sides with brown streaks (very common); the Yellow-rumped Warbler, bluish ash, with black and yellow—also abundant; the common Chestnut-sided Warbler; and the Maryland Yellow-throat, olive-green, the male with a mask of jet black. The Black-and-white Creeper, the Oven-bird, the Water-wagtail, Yellow-breasted Chat, and American Redstart also belong here. The great variety of less often observed New World Warblers is indicated by their names: the Cape May, the Black-throated Blue, the Black and Yellow, the Cerulean, the Bay-breasted, the Blackpoll, the Yellow-throated, the Orange-throated, the Black-throated Green, the Pine-creeping, Kirtland's Prairie, Redpoll, Kentucky, Connecticut, Mourning, Hooded, Green Black-capped, Canada, etc.—all occurring e. of the Missouri river, and some further west.—Not a few of the species are reckoned among the birds of the West Indies, because wintering there. Some European species

are in like manner found in Africa; and Asia has many species of Warbler, including some European. Australia has many species, some of very beautiful plumage.

WARBURTON, *wawr'bėr-ton,* WILLIAM, D.D.: Bishop of the Church of England: 1698, Dec. 24—1779, June 7; b. Newark, in the county of Nottingham. Young Warburton received his education at the school of his native town, and at Oakham, in Rutlandshire, returning home 1714 to pursue the profession of his father, an attorney. Having served the necessary apprenticeship, he practiced (it is said) as attorney at Newark; but his natural bent was toward literature, and he had always had a desire to take orders in the church. Quitting the legal profession with this view, he was, after due study, ordained priest 1727. In 1728 he was presented to the rectory of Brand-Broughton, in the diocese of Lincoln, where he remained 18 years, giving his time to intense study. After publishing some unimportant pieces, he issued, 1736, a treatise, *The Alliance between Church and State, or the Necessity and Equity of an Established Religion and a Test Law.* This work drew great and immediate attention; and 1737-8 it was followed by vol. I. of his *opus magnum,* by which chiefly he is remembered—*The Divine Legation of Moses, demonstrated on the Principles of a Religious Deist, from the Omission of the Doctrine of a Future State of Rewards and Punishments in the Jewish Dispensation.* It was an answer to the objection to the divine authority of the Mosaic writings, based by the deists on the ground that Moses gave no revelation of a future life, as a divine revealer certainly would have done. Warburton, instead of pointing out the intimations of a future life which appear in those writings, and showing the perfect fitness of such shadowed revelation to those times, accepted the deistic allegation as fact; and with his perverse liking for paradox asserted that it proved the divine authority of Moses, inasmuch as no human legislator would have omitted such a seemingly important sanction of morality. The work encountered a storm of adverse criticism; but it at once established the position of Warburton as one of the most potent intellects of the period. Its main argument has long been discredited as more or less 'precarious;' yet the book, in virtue of its vast learning, its vigor, ingenuity, and originality, keeps a place among notable English writings.

Becoming involved in the controversy which followed the appearance of Pope's *Essay on Man,* Warburton undertook the defense of the poet, and issued, 1739—40, *A Vindication of Mr. Pope's Essay on Man, by the Author of the Divine Legation.* The poet was much gratified; and between him and his vindicator a warm friendship was the result. The poet at his death (1744) bequeathed to Warburton one-half of his library, and such profit as might accrue from any edition of his works

published after his death. In 1757 Warburton was promoted to the deanery of Bristol; and 1760 Pitt (afterward Earl of Chatham) bestowed on him the bishopric of Gloucester. In his later years his mind became impaired; and he was utterly prostrated by the death of his only son, whom he did not long survive.

Warburton was a keen polemic—daring, urgent, ingenious, fertile, with great resources of learning; but frequently arrogant in tone, and tending toward rancor and insolence. However, he was devoid of the vices of malice and meanness. He was earnest and constant in his friendships. His argument is often brilliant and powerful; and the positions which he assumes are of a kind to be astounding to both sides in the debate. Among his many controversial works were an attack on the Methodists, a reply to Lord Bolingbroke, a reply to David Hume, and a keen argument with Bp. Lowth on Prophecy. A complete and splendid ed. of his works was pub. 1788, at the expense of his widow, by his friend, Bp. Hurd.

WARD, v. *wawrd* [Ger. *wart;* Goth. *vards,* a keeper: It. *guardare;* F. *garder,* to keep (see also GUARD)]: to repel; to turn aside anything mischievous, generally with *off;* in *OE.,* to keep in safety; to watch; to defend; to be vigilant: N. watch; guard made by a weapon in fencing; a stronghold; a subdivision of a county in Great Britain, as in Cumberland, Westmoreland, and Durham in the n. of England, and Lanarkshire and Renfrewshire in Scotland, representing a district formerly in charge of a *warden;* in the United States, one of the districts into which a city or town is usually divided for municipal purposes; confinement under guard; custody: person under age committed by lawful authority to the *ward* or care of a guardian; a ward can make no binding contract except for necessaries; when a person ceases to be a ward, he has legal right to an accounting from the guardian (see GUARDIAN; INFANT): large room in a hospital devoted to a particular disease or to a class of patients. WARD'ING, imp. WARD'ED, pp. WARD'ER, n. *-ėr,* a keeper; a guardian; a turnkey of a prison; in *OE.,* a truncheon by which an officer of arms forbade fight. THE WARD OF A LOCK, a curved ridge of metal in a lock which corresponds to a notch (also called a *ward*) in the proper key and acts as an obstacle to all other keys. THE WARD OF A TOWN, CITY, PRISON, etc., so much as is committed to the care of one alderman, councilor, or keeper. WARD-MOTE, n. *-mōt* (see under MOTE 2). WARD'-ROBE, n. *-rōb* [F. *garde-robe*]: a room, a portable closet, or a piece of furniture for hanging up wearing apparel in; wearing apparel belonging to any one person at one time. WARDROOM, room over the gun-room of a ship where the chief officers other than the commanding officer mess. WARD'SHIP, n. care and protection of a ward; state of being under a guardian.

WARD'EN, n. *-ĕn* [F. *gardien*]: one who has ward or guard of a thing; a chief or principal keeper, as in a prison; a name applied to the principal of some colleges; a warden-pear. WARDEN OF THE CINQUE PORTS (see CINQUE PORTS). WARDEN-PEAR, a pear that keeps well and is used chiefly for roasting or baking. WARD IN CHANCERY, a minor nuder the guardianship of the court of chancery.

WARD, ADOLPHUS WILLIAM: English historian: b. Hampstead, 1837, Dec. 2. He was graduated from Peterhouse College, Cambridge, and became a fellow of his college. In 1866 he was appointed professor of history and English literature in Owens College, Manchester, an institution of which he was principal from 1888 till his resignation in 1897. He took a leading part in the movement for the foundation of Victoria University, and in 1900 became master of Peterhouse. He published a translation of Curtius' *History of Greece* (1868-73), and in 1875 his valuable *History of English Dramatic Literature to the Death of Queen Anne* appeared (new ed. 1899). Among his other works are: *The House of Austria in the Thirty Years' War* (1869); *Chaucer* (1880); and *Dickens* (1882) in *English Men of Letters* series; *The Counter-Reformation* (1888); *Sir Henry Wotton* (1897); *Great Britain and Hanover* (1899); and numerous contributions to the *Encyclopædia Britannica* and the *Dictionary of National Biography.*

WARD, ARTEMAS: soldier: 1727-1800, Oct. 28; b. Shrewsbury, Mass. He graduated at Harvard 1748, and soon became a member of the Mass. general assembly and of the executive council. He was major in a militia regiment 1755, and was with Gen. James Abercrombie in an expedition against the French and Indians 1758. The provincial congress of Mass. appointed him brig.-gen. 1774, Oct. 27, and commander-in-chief of the Mass. forces 1775. The continental congress made him maj.-gen., and he commanded in the siege of Boston till the arrival of Washington; then Ward was second in command. He resigned his commission 1776, Apr. Ward became chief-justice of the Worcester co. common pleas court 1776; was pres. of the Mass. executive council 1777; then for 16 years member of the legislature. He was representative in congress 1791-95.

WARD, ARTEMUS. See BROWNE, CHARLES FARRAR.

WARD, EDWARD MATTHEW, R.A.: English painter: 1816-1879, Jan. 15; b. Pimlico, London. He early showed a taste for art, and was educated in a way to develop it. In 1835 he was sent to study at the Royal Acad.; and 1836 he went to Rome, where he gained, 1838, a silver medal, given by the Acad. of St. Luke. He returned to England 1839, stopping on the way at Munich, where he had lessons in fresco-painting from

Cornelius. Thereafter he annually exhibited pictures at the Royal Acad., though for some years without decisive recognition. In 1843 his picture, familiar as engraved, *Dr. Johnson perusing the Manuscript of the 'Vicar of Wakefield,'* drew great admiration. Of the eight pictures which he was commissioned to furnish for the corridor of the house of commons, two were done in oils and two in water-glass: the merit of all eight is unquestioned; one, *The Last Sleep of Argyll,* is ranked by competent judges among the most masterly British works in this kind. Ward was elected an associate of the Royal Acad. 1847, and academician 1855. Among his more notable pictures are: *The Fall of Clarendon, The Last Sleep of Argyll, The Royal Family of France in the Prison of the Temple, Charlotte Corday led to Execution.* Ward's pictures, though sometimes open to criticism in a purely technical view, have had wide popularity in reproduction as engravings.—He died from a wound inflicted by his own hand during mental aberration.

WARD, Elizabeth Stuart (Phelps): author: b. Andover, Mass., 1844, Aug. 13; daughter of Austin Phelps, D.D (q.v.); wife of Herbert D. Ward. Both her parents were scholars and authors, and she was brought up in the atmosphere of scholarship at Andover. At a very early age she showed capacity for authorship. She delivered a course of lectures at Boston Univ. 1876. In the advancement of women she has ever taken deep interest, and has also labored for the cause of temperance and social purity. She was married 1889. Apart from fugitive pieces and ephemeral contributions to journals, Mrs. Ward has published many separate works, all of which have received much popular approbation, while a few have circulated in an enormous number of copies. Of her work *Gates Ajar,* 20 editions were sold in the first year of its publication, 1868. Before the appearance of *Gates Ajar* she had published *Ellen's Idol* (1864); *Up Hill* (1865); *The Tiny Series* (4 vols. 1866-69); *The Gypsy Series* (4 vols.); *Mercy Gliddon's Work* (1866); *I Don't Know Her* (1867). Those which followed *Gates Ajar* are: *Men, Women, and Ghosts* (1869); *Hedged In* (1870); *The Silent Partner* (1870); *The Trotty Book* (1870); *Trotty's Wedding Tour* (1873); *What to Wear* (1873); *The Good Aim Series* (1874); *Poetic Studies* (verses) (1875); *Story of Avis* (1877); *My Cousin and I* (1879); *Old Maids' Paradise* (1879); *Sealed Orders* (1879); *Friends, a Duet* (1881); *Beyond the Gates* (1883); *Dr. Zay* (1884); *The Gates Between* (1887); *Jack the Fisherman* (1887); *Austin Phelps: a Memoir* (1891); *Fourteen to One* (1891); *Within the Gates* (1901); *Trixy* (1904); *The Man in the Case* (1907), etc. In collaboration with her husband, Herbert D. Ward, she has written *Come Forth* (1890); *A Lost Hero* (1891).

WARD, Frederick Townshend: soldier: 1831, Nov. 29—1862, Sep. 21; b. Salem, Mass. He was educated at the Salem high school; entered the French army, and served as lieut. during the Crimean war; was for some time in business in New York city, and was with Walker in Nicaragua. About 1860, during the Tae-ping rebellion (see Tae-pings), Ward entered the service of the Chinese emperor, in which his success over the rebels raised him to the rank of admiral-general. He was mortally wounded at the head of his command in an asault on Tse-ki, near Ningpo. He was succeeded by Charles G. Gordon (q.v.), and 'Ward's force' was changed to 'Gordon's brigade.'

WARD, Henry Augustus: naturalist: b. Rochester, N. Y., 1834, Mar. 9; d. Buffalo, N. Y., 1906, July 4. He was educated at Williams College, and after a course of study under Louis Agassiz, in the Lawrence Scientific School of Harvard, became Agassiz's assistant. He studied zoology in Paris and mineralogy in Freiburg 1854; then traveled in Egypt, Nubia, Arabia, and down the w. coast of Africa. As mining engineer he has travelled much on the North American continent and in Central America and the West Indies. He was prof. of natural sciences in Rochester Univ. 1860-75. There he founded a laboratory for making plaster casts and facsimiles of objects of natural history for the cabinets of educational institutions. In the laboratory taxidermy also is practiced on scientific principles. Ward's *Catalogues* possess scientific value. He published a *Notice of the Megatherium Cuvieri*, and *Description of the Most Celebrated Fossil Animals in the Royal Museums of Europe.*

WARD, James: painter: 1769, Oct. 23—1859, Nov. 16; b. London. He learned the trade of an engraver; but turning to painting and adopting the manner of Morland, so closely imitated that artist's style that several of Ward's productions have passed for works of Morland. In the National Gallery, London, is his most admired painting—*Alderney Bull, Cow, and Calf.* He was elected member of the Royal Acad. 1811, and practiced his art till after the age of 80 years.

WARD, John Henry Hobart: soldier: b. New York, 1823, June 17; d. Monroe, N. Y., 1903, July 25; son of James W., soldier in the war of 1812, and grandson of John W., soldier of the revolution. He enlisted in the U. S. army at the age of 18, and reached the rank of sergt.-maj. after 4 years' service. He served in the war against Mexico, participating in the siege of Fort Brown, in the battle of Monterey, where he was wounded, and in the capture of Vera Cruz. At the opening of the civil war he raised a regiment which he commanded at Bull Run and in the Peninsular campaign. He was made brig.-gen. of vols. 1862, Oct. 4. and commanded a brigade in the 3d corps at Fredericksburg, Chancellorsville,

Gettysburg, the Wilderness, Spottsylvania. He was wounded at Gettysburg and at Spottsylvania.

WARD, John Quincy Adams: sculptor: b. Urbana, O., 1830, June 29. He studied and worked under Henry Kirke Brown, sculptor, in New York and Brooklyn, 1850-57. He then, in Washington, modeled busts of many public men—Joshua R. Giddings, Alex H. Stephens, John P. Hale, etc. He opened a studio in New York 1861, and the same year produced his first full-length figure, a statuette, *The Freedman*, in bronze. This work, with the *Indian Hunter*, was exhibited at the Paris Exposition 1867. His figures, busts, groups, and statues, life-size, heroic, or colossal, are very numerous. Among his most notable works are: *Citizen Soldier* (colossal); *Shakespeare; Washington* (colossal); *Good Samaritan;* statues of Israel Putnam, Henry Ward Beecher, and numerous other notables; portrait busts of Valentine Mott, James T. Brady, Dr. Orville Dewey, etc.

WARD, Lester Frank, A.B., A.M., L.L.B., L.L.D.: American geologist: b. Joliet, Ill., 1841, June 18. Graduated from Columbian University in 1869, he was asistant-geologist in the United States geological survey in 1881-8, and geologist in 1888. He made especial investigations in the field of palæobotany. Among his publications are: *Guide to the Flora of Washington and Vicinity* (1881); *Sketch of Palæobotany* (1885); *Types of the Laramie Flora* (1887); *Geographical Distribution of Fossil Plants* (1888); *Outlines of Sociology* (1898); *Pure Sociology* (1903); *Text-book of Sociology*, with J. Q. Dealy (1905); etc.

WARD, Lydia Avery Coonley: American writer: b. Lynchburg, Va., 1845, Jan. 31. She was married in 1867 to J. E. Coonley (d. 1882) and in 1897 to H. A. Ward, and was president of the Chicago Woman's Club 1895-6. She has published *Under the Pines and Other Verses* (1895); *Our Flag*, a cantata, with music by G. F. Root (1896); *Singing Verses for Children* (1897); *Love Songs* (1898); *Christmas in Other Lands; Washington and Lincoln;* etc.

WARD, Mary Augusta Arnold: English novelist: b. Hobart, Tasmania, 1851, June 11. She is a daughter of Thomas Arnold (q.v.), second son of Dr. Thomas Arnold of Rugby and in 1872 was married to Thomas Humphry Ward. Her father, having become a Roman Catholic, gave up his educational post in Tasmania and returned to England in 1856 and there his daughter was educated. The father held appointments at Dublin and Birmingham, and after 1885 resided at Oxford, where she also lived with her husband till they removed to London in 1880. Her long residence in Oxford and consequent familiarity with the intellectual atmosphere of the university no doubt gave her that inclination toward ethical discussion which has so markedly influenced the

character of her writing. In 1890 she was one of the principal founders of University Hall, a settlement among the poor in the Saint Pancras district of London, and since 1897 occupying a spacious building near Tavistock Square, erected for that purpose by Passmore Edwards. In the work of this settlement Mrs. Ward has put a vast amount of personal endeavor and thought, and its influence has been commensurate with the pains that have been taken in its behalf. Mrs. Ward's first important literary work was a translation of *Amiel's Journal* (1885), but prior to this she had published *Milly and Olly,* a child's story. These were followed by *Miss Bretherton,* a story (1886); and *Robert Elsmere* (1888), which brought her almost immediately a world wide fame, being translated into several languages, and having an immense sale. Later works of hers are *The History of David Grieve* (1892); *Marcella* (1894); *Sir George Tressady* (1896); *Helbeck of Bannisdale* (1898); *Eleanor* (1900); *Lady Rose's Daughter* (1902); *The Marriage of William Ashe* (1904). She has also published *Unitarianism and the Future* (1894). All of Mrs. Ward's novels display much intellectual power and intensity of moral purpose, and her influence upon the social and ethical thought of the last 10 or 15 years in England and the United States has not been inconsiderable. Her novels are of varying degrees of excellence, but while all are worthy of serious attention, *Helbeck of Bannisdale* is perhaps the most powerfully conceived since *Robert Elsmere.*

WARD, May Alden: American writer and lecturer: b. Cincinnati, O., 1853. She was graduated from the Ohio Wesleyan Univ. in 1872 and in 1873 was married to W. G. Ward (b. 1848) (q.v.). She was president of the Massachusetts State Federation of Woman's Clubs from 1901 to 1904, and since 1904 vice-president of the General Federation of Woman's Clubs, has lectured widely and is the author of *Life of Dante* (1887); *Petrarch: His Life and Works* (1891); *Old Colony Days* (1896); *Prophets of the 19th Century* (1900).

WARD, Nathaniel: clergyman: about 1580—1652: b. probably in Haverhill, England. He graduated at Cambridge 1603, and was admitted to the bar. While traveling on the continent he was persuaded by David Pareus at Heidelberg to enter the Christian ministry, which he did, and was chaplain at Elbing, Prussia, for a time. Going back to England, he became rector of a country church in Essex 1628. He barely escaped excommunication by Laud, Bp. of London, 1631, for Puritanic non-conformity; he lost his living 1633, and, coming to America, was assistant minister of the church at Ipswich, Mass., 1634-5. He resided at Ipswich and employed his leisure in compiling for the general court of Mass. the *Body of Liberties,* a digest or code of the laws of the colony—a work that in spirit and in form is,

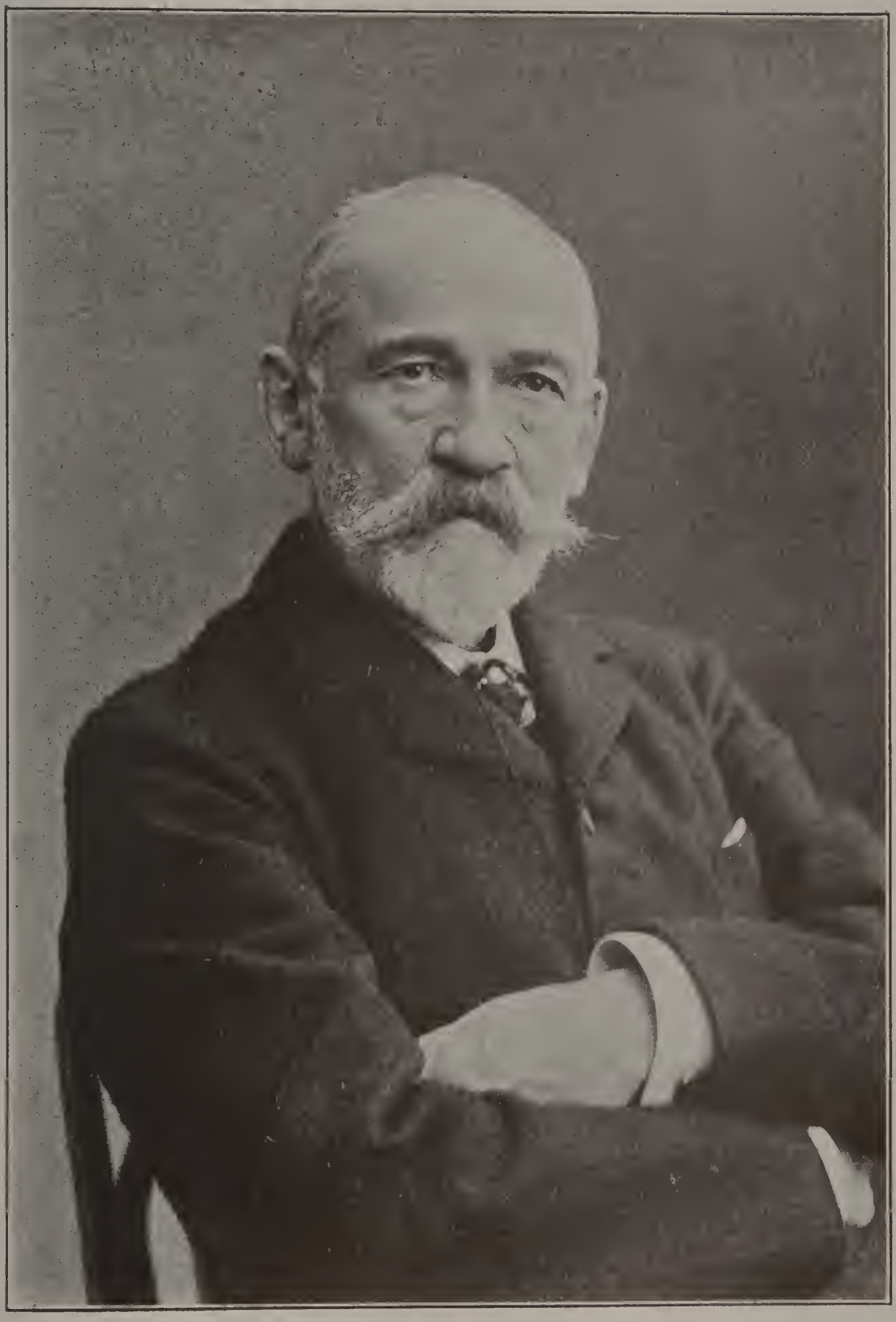
writes Dr. Francis C. Gray, in the main far in advance of the time in which it was compiled. At Ipswich, Ward also wrote, under the pseudonym Theodore de la Guard (exactly equivalent to his true name), *The Simple Cobbler of Agawam in America*—'a tremendous partizan pamphlet, . . . full of fire, wit, whim, eloquence, sarcasm, invective, patriotism, bigotry' (Moses Coit Tyler). Returning to England, Ward was settled as minister at Shenfield, Essex, till his death. He published several polemic pamphlets.

WARD, Samuel: statesman: 1725, May 27—1776, Mar. 26; b. Newport, R. I.; son of Richard W. (1689-1763), who was colonial governor of Rhode Island. He was merchant and farmer at Westerly, R. I., for many years, and represented that town in the legislature; was appointed chief-justice 1761, governor 1762; re-elected governor 1765. He was the only one of the colonial governors who refused to take the oath to enforce the Stamp Act; again he was chosen governor 1766, and persevered in resistance to the royal government. He was member of the continental congress 1774-76. Ward was one of the founders of the College of Rhode Island, now Brown University.

WARD, Samuel: soldier: 1756, Nov. 17—1832, Aug. 16; b. Westerly, R. I.; son of Samuel Ward. He graduated at Brown Univ. 1771; was captain of a company of infantry at the siege of Boston 1775; served under Benedict Arnold in the expedition to Canada, and was taken prisoner. On his release he became major of a Rhode Island regiment; was in the action at Red Bank and at Valley Forge. He served in Gen. Sullivan's campaign in Rhode Island; retired from the military service 1781, being then colonel. He was a merchant in New York 1790-1808, and then retired from business.

WARD, Susan Hayes: American author, sister of W. H. Ward (q.v).: b. Abington, Mass., 1838, Nov. 26. She was educated at Wheaton Seminary, Mass., under Lucy Larcom (q.v.), studied art in New York, Boston, Dresden, and Paris, and later studied at the Woman's Medical College in Boston. She afterward engaged in lecturing on art; was art-critic on the New York *Independent* in 1883-93; and office editor in 1892-8. Her writings include: *Christ at the Door* (1872); *Sabrina Hackett; History of the Broadway Tabernacle* (1901); *George Hepworth*, a biography (1903); etc.

WARD, Thomas Humphry: English author and journalist: b. Hull 1845, Nov. 9. He was educated at Oxford, and was married to Mary Augusta Arnold, since widely known as Mrs. Humphry Ward, in 1872. He edited *Ward's English Poets* (1881-2); *English Art in the Public Galleries of London* (1888); *The Reign of Queen Victoria* (1887); *Men of the Reign* (1885); *Men of the Time* (12th ed.)



L. Q. A. WARD.

WARD, Wilfrid Philip: English author, son of W. G. Ward (q.v.): b. Ware, Hertfordshire, 1856, Jan. 2. He was educated at Ushaw College, Durham; and the Gregorian University at Rome, and was lecturer at the former in 1890. He has been a member of the Council of the Catholic Union of Great Britain since 1886, and has published *The Wish to Believe* (1884); *The Clothes of Religion* (1886); *William George Ward and the Oxford Movement* (1889); *William George Ward and the Catholic Revival* (1893); *Witnesses to the Unseen* (1894); *Life and Times of Cardinal Wiseman* (1897).

WARD, William: English Baptist missionary in India: 1769, Oct. 20—1823, Mar. 7; b. Derby. He became a printer, but having studied for the ministry was sent to India as a missionary-printer by the Eng. Bapt. Missionary Soc. 1799. He settled at Serampore, having been forbidden by the East India Company to remain in Calcutta He printed Carey's translation of the New Test. into Bengalee, and various other translations and works by Carey and others issued from the mission press. He returned to Europe 1819, where he travelled for some time, and after a visit to the United States returned to Serampore 1821, where he died of cholera two years later. Ward wrote an *Account of the Writings, Religion, and Manners of the Hindoos* (4 vols. 1811). In the 2d ed., 2 vols. 1818, the title was changed to *A View of the History, Literature, and Religion of the Hindoos.* In the 4th ed., 3 vols. London 1822, *Religion* in the title is changed to *Mythology.*

WARD, William G., A.M., B.D.: American educator: b. Sandusky, Ohio, 1848, Nov. 5. He was graduated at Ohio Wesleyan University in 1872, studied theology at Drew Theological Seminary, was president of Spokane College in 1890-2, and professor of English literature at Syracuse University 1893-8. In the last named year he became professor of English literature at the Emerson College of Oratory, Boston, Mass. He has published *Tennyson's Debt to Environment* (1898); *The Poetry of Robert Browning* (1898); *Art for Schools* (1899); *Studies in Literature* (1901).

WARD, William George: English Tractarian leader and Roman Catholic theologian: b. London 1812, Mar. 21; d. Hempstead, London, 1882, July 6. Educated at Winchester College, he entered Christ Church, Oxford, in 1830, obtained a scholarship at Lincoln College in 1833, was graduated in 1834, and about the same time secured election to a fellowship at Balliol. He then took orders, and was a lecturer in mathematics and logic. He soon became a powerful influence in Oxford life, especially on its religious side, among those more or less affected by him being Archbishop Tait, Benjamin Jowett, Dean Stanley, and the poet Clough. He in turn was profoundly influenced by John Henry Newman, whose

famous *Tract 90* he defended in two pamphlets. The publication, in 1843, of William Palmer's *Narrative of Events connected with the Publication of Tracts for the Times* produced from Ward in reply his famous work, *The Ideal of a Christian Church considered in comparison with existing Practice* (1844), and the formal condemnation of this book by the university authorities precipitated Ward's reception into the Roman Catholic Church (1845), where he was soon followed by Newman and other Tractarians. In 1851 he became lecturer in moral philosophy in Saint Edmund's College, Ware, and in 1854 the pope gave him the diploma of PH.D. He resigned his lectureship in 1858, and in the *Dublin Review*, which he edited 1863-78, contended vigorously on behalf of ultramontane principles. He was founder and leading member of the Metaphysical Society (1869) which included such opposites as Huxley and Martineau. In addition to the works already mentioned Ward wrote: *On Nature and Grace* (1860); *Essays on the Philosophy of Theism* (1884), a work of great ability; and many smaller works. Consult: *William George Ward and the Oxford Movement* (1889); and *W. G. Ward and the Catholic Revival* (1893); both by his son Wilfrid.

WARD, WILLIAM HAYES, D.D., LL.D.: orientalist: b. Abington, Mass., 1835, June 25. Having graduated at Amherst College 1856, he studied for a short time in Union Theol. Sem., New York; was tutor in Beloit Coll., Wis., 1857-8; then studied theol. at Andover Seminary, and there graduated, 1859. He ministered to Congl. churches in Kan. 1859-60, when he was ordained minister. Next he was teacher in Williston Sem., and in the Utica, N. Y., Free Acad., and professor of Latin in Ripon College, Wisconsin. He has been editor of the New York *Independent* since 1870. Ward was chief of the Wolfe expedition to Babylonia 1864, and spent a year in exploring ruins south of Bagdad. On the return of the expedition, he published an account of its labors in a pamphlet. He is author of many papers in the *Bibliotheca Sacra* on biblical criticism and Assyriology, and has contributed to the *Proceedings* of the American Palestine Exploration Society, the Amer. Oriental Soc., and the Amer. Archæological Soc. He wrote the biographical memoir prefixed to the *Poems* of Sidney Lanier, 1884. Other works are: *World's Christmas Hymns* (1883); *Notes on Oriental Antiquities* (1886), etc.

WARD, WILLIAM THOMAS: soldier: 1808, Aug. 9—1878, Oct. 12; b. Amelia co., Va. He was educated at St. Mary's Coll., Lebanon, Ky., and began the practice of law. He served in the Mexican war as maj. of a Kentucky regt. He then entered the Kentucky legislature, and was representative in congress 1851-53. He was appointed brig.-gen. of vols. in the Union army 1861, and organized a brigade. He was engaged in the pursuit of Gen. Morgan 1862; in Sherman's march to the sea he

commanded a brigade in the 20th corps. He was brevetted maj.-gen. 1865.

WAR'DEN, David Adams, American musician: b. London 1815; d. Philadelphia, Pa., 1902, Feb. 4. He came to the United States before the civil war and was engaged as organist in various Episcopal churches. During the civil war period he composed the music for many patriotic songs, among which were *The Flag's Come Back to Tennessee* and *All Quiet Along the Potomac.* Both words and music of *Mother, Don't Weep for Your Boy* and *Tell Me, Ye Winged Winds* were his and he was also author of a book of chants.

WARDEN, David Baillie, American scholar: b. Ireland 1788; d. Paris, France, 1845, Oct. 8. He came to the United States when very young, received a classical education, was graduated from the New York Medical College; and in 1804 he was appointed secretary of the United States legation at Paris. He subsequently became consul and continued in that office until his death. His *Statistical, Political, and Historical Account of the United States of North America* (3 vols. 1819) was later published in both French and German, and his other writings include: *Inquiry concerning the Intellectual and Moral Faculties and Literature of the Negroes* (1810); *Recherches sur les antiquités de l'Amérique septentrionale* (1827); *L'Art de vérifier les dates, chronologie historique de l'Amérique* (10 vols. 1826-44); *Bibliotheca Americana* (1831); etc.

WARDEN: the title in the United States of certain public officers, such as game-wardens, who enforce the game laws, port-wardens, who are harbor officers, and the wardens of prisons.

In the Protestant Episcopal Church the church-wardens are two parochial officers, chosen annually at the Easter vestries, one by the minister, and one by the parishioners. Their duties are to protect the church-building and its appurtenances, to superintend the ceremonies of divine worship, and generally to act as the legal representatives of the parish.

In England the heads of All Souls, Keble, Merton, Wadham, and New colleges at Oxford are known as wardens. The Lord Warden of the Cinque Ports is an official with merely nominal duties now, though he was formerly of much importance. Lord Wardens of the Marches were formerly appointed to keep the disturbed border counties of England in a state of defense against the Scotch.

WARDHA, or Wurdha, India: (1) the chief town of the district of the same name, Central Provinces, on the left bank of the Wardha river (40 m. s.w. of Nagpur and 471 e. of Bombay. It was founded in 1866; as a junction station on the railway it has become a centre of the cotton trade. (2) The district, which was formed

out of Nagpur in 1862, has an area of 2,401 sq.m. The staple crops are millet, cotton, wheat, and rice. Here is produced the well-known Hinganghat cotton, which is exported to the amount of 25,000 bales a year. The breed of cattle is good, especially the trotting bullocks. A railway crosses the centre of the district. (3) The Wardha river rises in the Satpura hills, and flows s.e. for 254 m. to join the Weingunga; the united stream, under the name of the Pranhita, ultimately falls into the Godavery at Sironcha.

WARD'HOLDING: ancient military tenure of land in Scotland by which the vassal was bound to serve the superior in war whenever called on to do so. As the military duties of the vassal could not be performed when he was under age, the superior had a right both to the guardianship of his person and to the possession of his fee during his minority. An arrangement, however, was frequently made by which this right was commuted into an annual payment, in which case the fee was said to be held in *Taxed Ward*. Wardholding was abolished by 20 Geo. II. c. 50; such fees as were held ward of the crown being converted into Blanch-holdings and those held of subjects becoming feu-holdings, a yearly sum being made payable to the superior, as a recompense for the casualties abolished.

WARD'IAN CASES: close glass cases placed on a trough containing soil, and accurately fitted to it; intended for growth of plants in the windows of apartments. They are especially adapted to ferns and those plants which require an atmosphere more moist than that of an inhabited apartment. They derive their name from W. B. Ward, of London, who was led 1829 to construct cases of this sort from observing a small fern and grass growing in a closed glass bottle in which he had placed a chrysalis covered with moist earth. To the success attending them the invention of *vivaria* for marine animals is with great probability attributed.

WARDLAW, *wawrd'law*, RALPH, D.D.: most distinguished of Scotch Independent preachers and theologians: 1779, Dec. 22—1853, Dec. 17; b. Dalkeith. He was a Seceder by extraction, and studied in connection with the Associate Secession Church. Before he had completed his curriculum, however, he became convinced that congregational independency was the scriptural system of church order. In 1800 he began to preach; and soon settled in Glasgow as pastor of a Congregational church. In 1811 he was appointed professor of theology in the Glasgow Theological Academy, which office he retained (40 years) with his pastorate (of 50 years) till his death. Wardlaw's life was very laborious and earnest. Besides discharging faithfully and ably the duties of the pulpit and the professor's chair, he was a voluminous author, often involved in theological controversy, and prominent in the public

religious and philanthropical movements of the day. His intellect was acute, his understanding sound, and his style remarkable for perspicacity, vigor, and grace. As a platform speaker he had rare power. The most important of Wardlaw's works are: *Discourses on the Socinian Controversy* (1813); *Lectures on Ecclesiastes* (2 vols. 1821); *Essays on Assurance of Faith and on the Extent of the Atonement and Universal Pardon* (1830); *Discourses on the Sabbath* (1832); *Christian Ethics* (1833); *Discourses on the Nature and Extent of the Atonement of Christ* (1843); *The Life of Joseph and the Last Years of Jacob* (1845); *Congregational Independency* (1848); *On Miracles* (1852).—See *Life and Correspondence of Ralph Wardlaw,* by Dr. Alexander (1856).

WARD'S ISLAND: nearly circular island in the East river, between Randall's and Blackwell's islands: separated from Long Island on the s. and s.e. by Hell Gate, and from Randall's on the n. by Little Hell Gate; area 220 acres. It is used for charitable and penal institutions of New York, among them a home for invalid soldiers, a home for children, a homeopathic hospital, insane asylums for men and women, and a house of refuge. All these buildings are substantial, and some of them handsome structures.

WARE, a. *wär* [contr. of AWARE, which see (see WARY)]: on guard; on the watch (against something); aware; in *OE.,* cautious; wary: V. in *OE.,* to take heed of; to beware. WARE'LY, ad. in *OE.,* warily. WARE'-LESS, a. *-lĕs,* incautious; unwary; suffered unawares.

WARE, v. *wär:* a Scrip. spelling of WORE (see WEAR 2).

WARE, n. *wär* [AS. *war*]: general name for seaweed —usually in expression SEA-WARE.

WARE, n. *wär* [Icel. *vara;* Ger. *waare;* Dut. *waar,* an article of merchandise]: an article of manufacture or merchandise, now usually in the plural WARES, *wärz,* goods for sale; merchandise; articles; commodities. *Ware* in the singular is a collective name for articles of a particular kind, usually specified by some adjunct relating to their materials or origin, or to the use to which they are put—e.g., tin-*ware,* China-*ware,* table-*ware,* wooden-*ware,* etc. WARE'HOUSE, n. *-hows* [*ware* and *house*]: a store for goods, either for safe-keeping or for sale: V. to place or deposit in a house for safe-keeping; especially, to place in the stores of government, previous to paying duty. WARE'HOUSED, pp. *-howzd.* WARE'HOUSEMAN, n. *-hows-măn,* one who keeps a warehouse; man employed in or having charge of a warehouse. BONDED WAREHOUSE, building in which duty-paying and excisable goods may be stored at a low charge, the tax or excise duty being levied on the whole, or the part, only at such times as the owner may choose

to withdraw them. WAREHOUSE RECEIPT, receipt given by a warehouseman for goods or chattels delivered into his possession for storage. Such instruments, though technically not negotiable, have been made so in some states, inasmuch as they represent property, and may be assigned, the holder having as good a title as if the goods themselves had been delivered to him. See WAREHOUSEMAN, in Law: WAREHOUSING SYSTEM.

WARE, Mass.; town in Hampshire co.; on the Ware river, and on the Boston & M., and the Boston & A. railways; nearly in the centre of the state, about 25 m. n.e. of Springfield, and about the same distance w. of Worcester. It was settled in 1673 by Jabez Olmstead, and in 1761, Nov. 25, was incorporated as a precinct, and in 1775 was made a town. The town has a general elevation of about 550 ft. above sea-level. The waterworks are owned and operated by the town. The chief manufacturing establishments are cotton, woolen, and hosiery factories, shoe factories, and machine shops. The government census of 1900 gives the number of manufacturing establishments 100; the number of employees in manufactories, 2,777; the amount of wages paid annually, $979,930; the total cost for material used during the year $2,119,178; and the value of the products, $3,681,-069. The surrounding farms and the nearby manufacturing villages contribute to Ware's industrial prosperity. There are seven churches, a public high school, established in 1850, public and parish graded schools, and a public library which contains about 12,000 volumes. There is one national and one savings bank. The government is administered by means of town meetings, at which, by popular vote, the town officers are elected. Nearly one third the population are of foreign birth, chiefly French Canadians and Poles. Pop. (1910) 8,774.

WARE, HENRY, D.D.: Unitarian minister: 1764, Apr. 1—1845, July 12; b. Sherborn, Mass.; descendant of Robert Ware, one of the first settlers in Dedham, Mass. He graduated at Harvard 1785; was pastor of a church at Hingham, Mass., 1787-1805, then becoming Hollis professor of theology at Harvard. His election to that post is memorable as having led to the controversy which resulted in the separation of the Unitarian from the 'Orthodox' Congregationalists. Ware resigned his divinity professorship 1840, but continued for two years longer to act as professor of pulpit eloquence. He published several volumes of sermons, theological tractates, and polemic pamphlets.

WARE, HENRY, D.D.: Unitarian minister: 1794, Apr. 21—1843, Sept. 22; b. Hingham, Mass.; son of Henry Ware. Having graduated at Harvard 1812, he was teacher in Phillips Exeter Academy 1812-14; was ordained minister of a Unitarian church in Boston 1817. He was a leader in the Unitarian body, and, 1819-22,

edited its newspaper organ, the *Christian Disciple.* He resigned his pastoral charge 1830, and was Parkman professor of pulpit eloquence in the Harvard Divinity School 1830-42. He published *Hints on Extemporaneous Preaching; Formation of Christian Character;* memoirs of Joseph Priestley and others; sermons, essays, and poems.

WARE, WILLIAM: Unitarian minister and author: 1797, Aug. 3—1852, Feb. 19; b. Hingham, Mass.; son of Henry Ware (1764-1845). He graduated at Harvard 1816, and at the Divinity School 1819; was pastor of the First Unitarian Church, New York, 1821-36; at Waltham, Mass., 1836-7; editor of the *Christian Examiner* 1839-44; pastor of a Unitarian church at West Cambridge 1844-5; travelled in Europe 1848-9. He was author of *Zenobia,* published first as *Letters from Palmyra; Probus,* afterward entitled *Aurelian; American Unitarian Biography;* and *Lectures on the Works and Genius of Washington Allston.*

WARE, WILLIAM ROBERT, D.D., LL.D.: architect: b. Cambridge, Mass., 1832, May 27. He graduated at Harvard 1852, and at the Lawrence Scientific School 1856; was professor of architecture in the Massachusetts Institute of Technology 1865-81; and from 1881-1903 held the same chair in Columbia University, in the latter year becoming professor emeritus. In 1883 he published *Modern Perspective: a Treatise on Plane and Curvilinear Perspective.* He designed the American School of Classical Studies at Athens, Greece; the Union railway station at Worcester, Mass.; and, in conjunction with Henry Van Brunt, the Memorial Hall of Harvard University.

WARE'HOUSEMAN, in Law: person who for hire receives goods and merchandise or other chattels, to be stored in his warehouse. He is bound to use ordinary care in preserving the property placed in his care, his liability beginning as soon as the goods arrive and his hoisting apparatus is employed to take them into his premises. He has a lien on the goods for rent, services, etc. He may not make delivery to any but the legal holder of his receipt.

WARE'HOUSING SYSTEM: plan for lessening the pressure of excise or customs duties by postponing payment of them until the goods that they are laid on pass to the consumer or to the retail dealer; warehouses for their storage—*bonded warehouses*—being provided by the government, the merchant paying a fee or rent for the custody of the articles stored. Bonding in this manner was part of the scheme of Sir Robert Walpole 1733, generally known as the Excise Scheme, which was defeated on account of its unpopularity. The system was first authorized in the United Kingdom by an act of George III. 1802. The warehousing system has also—by retaining the goods for the owner, whoever he may be—created

a complete system of paper money in the transference of the title-deeds, as they may be called, of such goods—the dock-warrants, warehouse-receipts, or other documents—whose possession is equivalent to possession of the goods; hence money may be advanced on such goods with as much ease and security as on bills of lading. The *Warehousing System* of the United States, established by act of congress 1846, Aug. 6. By the act of 1854, Mar. 28, the system was extended by the establishment of private bonded warehouses. Goods liable to duty are warehoused in a bonded warehouse, and are called goods in bond. The warehouse is kept by a bonded storekeeper, who gives a bond of sufficient value, and with satisfactory security to the government for the performance of his duties. When goods are warehoused by an importer in a bonded store they may be transferred by an order, addressed by the importer to the storekeeper, to any other person, the new owner assuming the responsibilities of the importer. Goods in a bonded store are always open to the inspection of the officers of customs, and can only be inspected by the owner in the presence of the proper officer. Any importer who fraudulently gains access to goods stored by him without the presence of the proper officer is liable to a penalty of $500. Goods must be stored and remain in store in their original packages, unless when permission is given before or after storing to sort or repack them. Any infringement of this regulation, or of the regulations for storing or removing goods, subjects to heavy penalties, commonly to the forfeiture of the goods. Goods under bond may on application be removed at the expense of the owner as often as required from one warehouse to another, or by coast, or inland carriage, from one port to another, being stored on the same terms in the new port or warehouse as in the old. The warehousekeeper is bound to store the goods so that easy access can be had to each package. Goods which have been in warehouse for five years must be rewarehoused, or they will be liable to be sold.

WARFARE. See under WAR.

WAR'FIELD, BENJAMIN BRECKENRIDGE, D.D., LL.D: educator and author: b. Lexington, Ky., 1851, Nov. 5. He graduated at Princeton Univ. 1871, and at Princeton Theol. Sem. 1876; studied at Leipzig 1877; was Presb. pastor for a short time at Dayton, O., then at Baltimore, Md., 1877-8. He was instructor (1878-87), and later prof. of N. T. lit. and exegesis, in the Western Theol. Seminary, Alleghany, Penn.; since 1887 prof. of didactic and polemical theology in Princeton Theol. Seminary. Warfield was managing editor with Dr. Charles A. Briggs (q.v.) of the *Presb. Review* 1889, and since 1890 managing editor of the *Presb. and Reformed Review*. Among his published works are: *The Divine Origin of the Bible* (1881); *Canon of the N. T.* (1892);

Gospel of the Incarnation (1893); *Two Studies in the History of Doctrine* (1893); *The Right of Systematic Theology* (1897); *The Significance of the Westminster Standards* (1898); *Designations Applied to Our Lord* (1906); *The Lord of Glory* (1907); etc.

WAR'FIELD, CATHARINE ANN (WARE): author: 1816, June 6—1877, May 21; b. Natchez, Miss.; daughter of Nathaniel Ware, of Mass. (1789—1854), and on her mother's side descended from Capt. Charles Percy, one of the early colonists of Louisiana. She was educated in Philadelphia, settled in Ohio with her parents, married Robert E. W., of Lexington, Ky., 1833. In association with her sister, Eleanor Percy Ware Lee (1820—49), she published two vols. of poems (1844-46). Mrs. Warfield herself wrote many romances, among them *The Household of Bouverie* (1860); *Romance of the Green Seal* (1867); *the Cardinal's Daughter* (1877).

WAR'FIELD, ETHELBERT DUDLEY, LL.D.: educator and author: b. Lexington, Ky., 1861, Mar. 16. He graduated at Princeton 1882; afterwards went abroad and took a post-graduate course at Oxford, subsequently studying in Germany. After his return to the United States, he graduated at the law-school of Columbia Univ., and was admitted to the bar 1884. In 1888 he was elected president of Miami Univ., Oxford, O.; and 1891 he was elected pres. of Lafayette College, Easton, Penn. In both institutions he has added to his duties as president the charge of the department of history. He published a historical sketch, *The Kentucky Resolutions of 1798* (1887); *At the Evening Hour* (1898); *Memoir of Joseph Cabell Breckinridge, U. S. N.* (1898); etc.

WARHAM, *wawr'ham*, WILLIAM: Archbishop of Canterbury: about 1450—1532, Aug. 22; b. at Church Oakley, in Hampshire. He studied at Winchester and at New College, Oxford. He qualified to practice law, became known to Henry VII., and was attached to an embassy to the court of Burgundy. Having taken holy orders, his services in relation to Perkin Warbeck's claim to the crown obtained for him rapid preferment in church and state; and he was soon bp. of London and lord chancellor (1502), and then primate (1503). He fell into disfavor with Henry VIII., and 1515 resigned the great seal to Wolsey. He was a close friend and favorer of the New Learning and of its apostles in England—Erasmus, Dean Colet, Grocyn, and Linacre. In regard to the divorce of Catharine of Aragon, he passively supported the king, and he agreed to recognize the king's supremacy. He was disposed toward some reforms in the church, in the same sense and measure as Erasmus was; but would never have become a 'reformer,' as the word soon came to be understood.

WARINESS, WARILY, WARIMENT: see under WARY.

WARING, George Edwin: American sanitary engineer: b. Poundridge, N. Y., 1833, July 4; d. New York, 1898, Oct. 29. He was a pupil in agriculture of James J. Mapes, in 1853-5 lectured in Vermont and Maine on improved farming methods, and in 1855 was made by Horace Greeley manager of the latter's well-known experimental farm at Chappaqua, N. Y. In 1857-61 he was agricultural and drainage engineer of Central Park, New York, whose drainage system he planned. Having entered the Federal army in 1861 as major of the 39th New York volunteers (Garibaldi Hussars), he fought at the first Bull Run, was transferred to the Department of the Southwest, recruited a battalion of cavalry (Frémont Hussars) at St. Louis, and when these were consolidated with other troops to form the 4th Missouri cavalry, he was made colonel of that regiment. He served as such until mustered out of the service in 1865. In 1867-77 he was manager of the Ogden Farm, Newport, R. I., writing during that time the *Ogden Farm Papers* for the *American Agriculturist*. At the time of the yellow-fever epidemic in Memphis, Tenn., in 1878, he was appointed to alter the drainage system there; and subsequently he devoted himself to sanitary engineering. In 1882 he was appointed a member of the National Board of Health, with which he remained connected for several years; and in 1894 he became assistant-engineer of New Orleans From 1895 to 1898 he was street-cleaning commissioner of New York; during his administration he thoroughly reorganized his department and brought it to a high state of efficiency. In 1898 he was selected to be head of a commission for the improvement of sanitary conditions in Havana, Cuba, with the purpose of eradicating yellow fever. He prepared a detailed report of great value, but died of the fever not long after his return to the United States. He was a member of the Institution of Civil Engineers, Great Britain, fellow of the Sanitary Institute of Great Britain, honorary member of the Royal Institute of Engineers, Holland, and corresponding member of the American Institute of Architects. Among his published works are: *The Elements of Agriculture* (1854); *Whip and Spur* (1875); *A Farmer's Vacation* (1876); *Village Improvements and Farm Villages* (1877); *Sewerage and Land Drainage* (1889); and *Modern Methods of Sewage Disposal* (1894).

WARK, David: Canadian legislator: b. near Londonderry, Ireland, 1803, Feb. 10; d. Fredericton, N. B., 1905, Aug. 20. In 1825 he emigrated to New Brunswick, there took up shipbuilding, bookkeeping, and teaching until 1836, turned to mercantile life at Richibucto, later adding to his interests milling and lumber trade. He held office as a county magistrate and judge of the court of common pleas, in 1842 was elected from the county (Kent) to the provincial legislature, and in 1846 re-elected. From 1851 to 1867 he was a representative of

the county in the legislative council, being in 1858-62 in the executive council, and for a time holding the post of receiver-general. In 1867 he was one of the original senators appointed to the Senate of Canada under the British North America act. Throughout his political career he was identified with the Liberal party. In the development of agriculture, the extension of trade, and the promotion of education, he was prominently concerned. He undertook in 1847 the furtherance of legislation favoring reciprocal trade between the provinces, and such legislation eventually proved of influence in connection with the reciprocity treaty of 1854 between Canada and the United States. The perfected system of the New Brunswick savings bank was largely due to his initiative; and he was chiefly instrumental in bringing about the movement which in 1847 resulted in the constitution of the provincial board of education of New Brunswick, with the attendant changes, and in the reorganization of King's College as the University of New Brunswick (1859). His centenary was formally observed in 1904 by the presentation of addresses, it being claimed for him that he was the world's oldest legislator; and on 28 April a portrait of him by W. Forbes, A.R.C.A, was unveiled in the Senate.

WARKAMOO'WEE: in Ceylon, the name of a canoe used with outriggers. It is generally manned by four or five Lascars, who sit grouped together for hours at the end of the lever, adding or taking away a man according to the strength of the wind. These canoes often sail 10 miles an hour.

WARLIKE. See under WAR.

WARLOCK, n. *wawr'lŏk* [AS. *wærloga,* a breaker of his word or pledge—from *wær,* truth, and *loga,* a liar]: a sorcerer; a wizard. WAR'LOCKERY, n. *-rĭ,* the spells and magic practiced by a warlock.

WARM, a *wawrm* [Dan. and Sw. *varm;* Icel. *varmr;* Dut. and Ger. *warm;* OL. *formus;* Gr. *thermos,* hot: Skr. *gharma,* heat]: having heat in a moderate or gentle degree; having little or no winter, as a climate or region; zealous; ardent; easily excited or provoked; irritable; excited; flushed; enthusiastic; *familiarly,* easy and safe in money matters, as, 'he was deemed a *warm* man;' wealthy; in *paint.,* applied to colors that have yellow or yellow-red for their base; intimate, close, as *warm* friends: V. to impart heat to in a moderate degree only; to excite to ardor or zeal in; to animate; to make ardent; to grow less cold; to become moderately heated; to become warm or animated. WARM'ING, imp. WARMED, pp. *wawrmd.* WARM'ER, n. *-ẽr,* one who or that which warms. WARM'LY, ad. *-lĭ,* with gentle heat; ardently; with warmth; enthusiastically. WARM'NESS, n. *-nĕs,* warmth. WARMTH, n. *wawrmth,* state of being warm or ardent; gentle heat; earnestness or irritability—as ap-

plied to temper, 'he answered with much *warmth;*' fervor of mind; animation; in *paint.*, a tone of color arising from the use of colors expressive of heat, as reds, deep yellows, russet browns, and the like. WARM BATH, a bath heated to nearly or a little over the temperature of the human body. WARM-BLOODED, having warm blood; applied to animals with blood ranging in temperature from 98° to 112° F.; figuratively, warm-hearted, moved by generous impulses. WARM-HEARTED, a. sympathizing; cordial; sincere. WARM-HEARTEDNESS, n. warmth of heart; sympathy; cordiality. WARMING-PAN, a covered vessel containing hot coals or hot water for heating beds; a person put into a place or office until another person becomes eligible for it—he is then said 'to keep it *warm* for him.'—SYN. of 'warm, a.': hearty; vigorous; sprightly; sincere; cordial; frank; candid; open; ingenuous; fervent; glowing; keen; violent; furious;—of 'warmth': glow; heat; zeal; ardor; fervency; cordiality; vehemence; eagerness; excitement.

WARMAN, CY: American journalist: b. Greenup, Ill., 1855, June 22. He became editor of the *Western Railway,* Denver, Colo., in 1888; of the Creede, Colo., *Chronicle* in 1892; and became known as the 'Poet of the Rockies.' He wrote the words of the popular song *Sweet Marie,* and has published: *Tales of an Engineer* (1895); *Snow on the Headlight* (1899); *Short Rails* (1900); a volume of verse; *The Last Spike* (1906); etc.

WARM-BLOODED ANIMALS: those vertebrates which possess a four-chambered heart and spongy lungs; the heart and lungs being so arranged that the whole of the venous or impure blood is propelled over the large but closely packed capillary area of the lungs, by successive contractions of a special ventricle, receiving it from a distinct auricle (these being called the right or pulmonary ventricle and auricle), while the blood thus purified by the action of the air in the lungs is conveyed to another auricle, and propelled over the whole system by a second distinct ventricle (these being known as the left or somatic auricle and ventricle). The only animals which exhibit these structural peculiarities are mammals and birds. In man and in the ox the mean temperature of the interior of the body is 100° or a little less (see TEMPERATURE OF THE BODY); in the mouse it is 99°; in the whale it is 103°. In birds it ranges, in different species, from 106° to 112°. The warm-blooded animals present, however, gradations of their heat-making power. In the hibernating animals there is commonly a loss of heat, of from 10° to 20°, during their winter sleep; and in the bat the temperature falls to 40°. In the cold-blooded animals, the fishes, amphibians, and reptiles, the temperature of the blood rarely exceeds that of the surrounding medium.—See BIRDS, MAMMALIA, ANIMAL HEAT.

WARMING AND VENTILATION: subjects closely connected in their relation to comfort and health.—WARMING.—A certain temperature, constant within narrow limits, is essential for the life of warm-blooded animals, and the heat by which this temperature is maintained is produced by the vital actions of the body itself: see ANIMAL HEAT: TEMPERATURE OF THE BODY. In the case of man, however, at least in ordinary climates, and in the civilized condition, the heat of the body, if allowed freely to escape, would be dissipated faster than it is produced; hence the necessity of clothing, houses, and other means of retarding its escape. To allow the body to continue depressed in temperature beyond the natural state, instead of hardening, infallibly weakens its vitality, and sows the seeds of disease. Statistical reports show that, exactly as the thermometer sinks, the rate of mortality rises, and certain fatal diseases become more prevalent: the vitality of the community decreases as the warmth of the atmosphere decreases. Thus the economy of heat is one of the primary elements in the art of living.

Where fuel is scarce, the resource against the cold of winter is thick clothing indoors as well as out. This is said to be the regular practice in China; and even in s. Europe fires are dispensed with in weather when we should think them absolutely necessary, and additional wrappings are considered as appropriate while sitting in the house as in the open air. But the preferable resource against cold is the artificial warming of apartments, which is the subject now to be treated. For the general principles as to generation of heat by combustion, and its diffusion, see COMBUSTION: FLAME: FUEL: HEAT.

The great aim, it may be premised, in all plans of warming is, as expressed by Dr. Arnott, '*to obtain everywhere on earth, at will, the temperature most congenial to the human constitution, and air as pure as blows on a hill-top.*' Warming and ventilation should not be antagonistic operations. The various plans of warming hitherto tried may be classed under six heads: The Open Fire, Stoves, Gas, Steam, Hot Water, and Hot-air Furnaces.

The Open Fire.—The Romans warmed their apartments chiefly by portable stoves or chafing-dishes, without any regular exit for the smoke and fumes; and a brasier of charcoal is still the chief means of heating sitting-rooms in Spain and Italy, which are in general without chimneys. The Chimney (q.v.) is a modern invention.

The open coal-fire glowing in a grate, cheerful and social in its influence and associations, has its most serious disadvantage in its waste of fuel. About one-half of the heat produced by a common fire goes up the chimney, while about a fourth of the heat which is radiated into the apartment is, in ordinary circumstances, carried into the chimney between the fire and the mantel-piece, and thus lost. It has been calculated that only about one-eighth part of the heat-producing power of the fuel used in common fires is realized, all the rest being dissipated into the surrounding atmosphere.

Grates.—One improvement consists in diminishing the quantity of metal in immediate contact with the fuel, and forming the back and sides of the grate of fire-bricks. The bricks act like clothing, and keep in the heat of the coals, thus rendering the combustion more complete, and the fire far hotter; whereas iron, being a good conductor, passes the heat off into the wall, making the coals that touch it dull and black. Moreover, as radiation depends on the intensity more than on the quantity of heat, the same quantity of fuel burned in a brick-lined grate throws a greater proportion of that heat forth into the room.

When the sides of a fireplace are square with the back, none of the heat falling on them is given out again into the room; therefore the sides, or *covings*, as they are called, are inclined to the back at an angle of about 130°; and sometimes they are made curved and of polished metal, to reflect the heat without absorbing it. It is questionable if simple brick slabs, placed at the proper angle, do not throw out more heat than the most splendid polished metal plates; for though the bricks do not reflect the rays of the fire, they become heated themselves, and then radiate their heat into the room. The rays of heat do not warm the air directly: it is when the rays from the fire fall on the floor, furniture, walls, or persons in the room, that they give out their heat; and the air, by coming in contact with these heated bodies, is gradually warmed.

The law that radiant heat neither affects nor is affected by the surrounding air explains the fact that an apartment may feel very cold though the air in it be at high summer heat. A church or other massive stone building may, in frosty weather, be filled with artificially heated air and yet retain its chilling effect for many hours. The warmth of the living body is lost in two ways: the film of colder air that touches it receives part of its heat by conduction, and rising up makes room for another film to do the same: a moderately heated body in cooling is robbed of about half its heat in this way. The other half is given off in rays, which pass through the air and impinge on the objects around. These objects are radiating back heat in return; but, their temperature being low, the return is small, and the warmer body is colder by the difference. Hence we are chilled by a cold wall or a cold window without touching it, and though the air between us and it may be at 70°.

The chief object of the grate is to present as large a surface as possible of glowing fire to the front. With this view, the grate is made long and deep, in proportion to its width from front to back.

The chimney-throat, drawing in a constant wide current of the warm air of the room, while it carries off heat, does very efficient service in ventilating the room; see CHIMNEY. A great quantity of heat indeed is carried off in combination with the hot gases, though no more air is allowed to enter a fire than is necessary for complete combustion. The proportion thus carried off is greatest in the case of fuel that burns with flame. Experiment shows that a fire

of wood radiates one-quarter of its heat, the rest passing up; while the radiation from wood charcoal is one-half of the whole heat produced. Every one has felt that a *blazing* fire has far less warming effect than a glowing one: not that flame has not intense heat in it—more intense even than a glowing fire; but flame gives out heat by contact, not by radiation. Thus any mode of heating that depends on direct radiation, as the open fireplace chiefly does, involves great waste of fuel. This can be avoided only by applying the heat on a different principle; which consists in causing the fire to heat first certain apparatus with considerable surface, which then, by radiation and contact with the air of the apartment, diffuses its heat throughout it. This is the principle of the other methods of warming, which we proceed to describe. The consideration of methods that combine the two principles will follow.

Warming by Stoves.—A *close stove* is simply an inclosure of metal, brick, or earthenware, which is heated by burning a fire within it, and then gives out its heat to the air by contact, and to surrounding objects by radiation. The simplest, and, so far as mere temperature is concerned, the most effective and economical of all warming arrangements, is what is called the Dutch stove, which is simply a hollow cylinder or other form of iron standing on the floor, close at top, and having bars near the bottom on which the fire rests. The door by which the coals are put in being kept shut, the air for combustion enters below the grate; and a pipe, issuing from near the top, carries the smoke into a flue in the wall. If this pipe is made long enough, as by giving it, if necessary, one or more bends, the heated gases from the fire may be made to give out nearly all their heat into the metal before they enter the wall: thus nearly the whole heat of the combustion remains in the room. The chief objection to this form of stove is, that the metal is apt to become overheated, which has hurtful effect on the air. Part at least of the unwholesomeness of air highly heated arises from its excessive dryness; it parches and withers everything that it touches, like the African simoom. It must not, however, be supposed that this is peculiar to air heated by contact with metal: *air suddenly heated is always unwholesomely dry*. This is an important point. A cubic ft. of air, say at 32°, can contain a certain quantity of moisture and no more; but if heated to 80° it is capable of containing *five* times as much, and has thus become *thirsty*, and drinks up moisture from everything that contains any. The heating of air, therefore, does not dry it, in the sense of taking moisture from it; it only renders it greedier of more, and this is equally true whether it is heated by a stove or an open fire. The chief difference is, that with an open fire the warming is more gradual, and no part of the air becomes very highly heated; while the air that touches a metal plate heated near redness is all at once rendered intensely thirsty; and before its fierceness is tempered, by thoroughly mixing with the rest of the atmosphere of the room, it must be highly pernicious. But whenever

the temperature within doors is much higher than without, the air is in a too thirsty state, and parches the skin and lungs, unless means be taken to supply the necessary moisture. Hence an *evaporating pan or like contrivance is an essential part of this kind of warming apparatus.*

All improvements on this simple form of stove aim at avoiding a high heat in the warming surface, chiefly by lining the fire-box with brick, and inclosing it in several casings, so as to enlarge the heated surface. In the kind of stove called a *cockle*, the fire is burned in a small furnace within the inner case, and the air is warmed by circulating between the inner and outer cases. When placed in the apartment to be warmed, the outer casing has perforations about the top for issue of the warmed air. For heating large buildings, the stove is placed in a separate furnace-room; and the warm air is conveyed to the different parts of the building in pipes or flues, while fresh air is drawn to the stove through a channel leading from outside the building to the openings in the outer casing.

In Russia, many parts of Germany, and other northern countries of Europe, the stoves are usually of brick, covered with porcelain. They are of the size of a large and very high chest of drawers, and usually stand in a corner of the room. The fire is burned in a furnace near the bottom, and the heated smoke is made repeatedly to traverse the structure from side to side, along a winding passage, before it reaches the top, where a pipe conveys it, now comparatively cold, into a flue in the wall. The heated mass of brick continues to warm the room long after the fuel is burned. As the people in those countries are not accustomed to such warmth in rooms as is usual in this country, it is generally considered sufficient to heat the stove once a day. The same quantity of wood burned in an open grate would be consumed in an hour, and would hardly be felt.

Warming by Gas.—A prejudice arose against gas as a medium of heat, from lack of skill in the first attempts to employ it. But when care is taken to carry off the products of combustion by a pipe, and to prevent overheating, gas stoves are economical and pleasant, and capable of being used in situations where a common stove is inadmissible.

In stoves, gas may be burned with the air or Bunsen burner, or with the luminous burner. The Bunsen burner consists of a small brass cylinder or chimney, set over the gas-jet like the glass of an argand lamp, with openings near the bottom to allow air to enter. The gas, being admitted into this before lighting, mixes with the air, and when lighted at the top burns with pale-blue flame: complete combustion and a smokeless flame are obtained in this way. Still, it must not be forgotten that there is burned air—a cubic ft. of carbonic acid, besides a quantity of watery vapor—for every cubic ft. of gas used: therefore, with the Bunsen or the luminous flame burner, these gaseous products should, wherever it is possible, be conducted away.

Steam and Hot Water.—The immediate warming agent

in these two methods is the same as in the low-temperature stoves—viz., an extensive metallic surface moderately heated; but instead of heating these surfaces by direct contact with the fire, the heat is communicated first to water or steam, and thence to the metal of a system of pipes. This affords great facility in distributing the heat at will over all parts of a large building. Other advantages are freedom from dust and from risk of ignition of the material of the building.

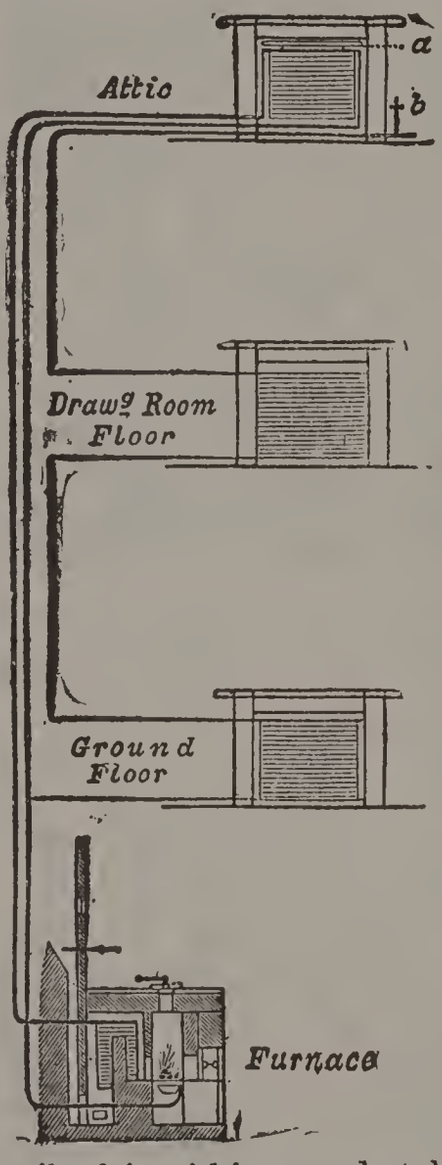
Steam.—In steam-warming in establishments where steam-power is used, the same boiler and furnace serve both purposes. When steam enters a cold vessel, it is condensed into water, and at the same time gives out its latent heat till the vessel is raised to 212°, when the condensation ceases. The condensing vessel may be an iron pipe placed round the wall of the apartment near the floor. In admitting fresh air into the room it may be made to pass over this pipe, and thus be warmed. Radiators composed of tubing, or of hollow metal vessels, are in common use. The steam is conducted from the boiler by a smaller tube, which may be covered with list or other material, to prevent all condensation by the way; and the admission of the steam is regulated by a cock within the apartment, means being provided for allowing the air to escape. Allowance must be made for expansion of the tubes by heat; and they are so arranged that the condensed water is conveyed back to the boiler.

Hot Water.—Hot-water apparatus was applied as early as 1777 by M. Bonnemain, in Paris, to warm the hot-houses at the Jardin des Plantes, as well as for the artificial hatching of chickens. It was introduced into England by the Marquis de Chabannes 1816, and is now very extensively used. One of its advantages is that the heat begins to be distributed, in some degree, as soon as the fire is lighted, while with steam apparatus the whole of the water must be at boiling-heat before any steam enters the pipes.

There are two kinds of hot-water apparatus—high-pressure and low-pressure. In the first the water is confined, and can be heated to any degree; in the other it is open to the air, and cannot be heated above 212°. The figure shows the way in which water is made to carry the heat of a furnace to any part of a building by the low-pressure method: *a* is a boiler, from the top of which a tube issues, and after circulating through the building re-enters near the bottom. At the top of the circuit there is a funnel, or a small cistern, *c*, by which the tubes and boiler may be kept full. When the fire is lighted at the bottom of the boiler, the heated portion of water, being lighter than the rest, rises toward the top through the tube, *bb*, while the colder water from *dd* flows in to take its place. The tube is made to traverse the apartments to be warmed, where it gives out its heat to the air; the returning portion of the pipe is

thus always colder, therefore heavier than the other, so that the circulation is constantly kept up. The warming surface is increased, wherever it is necessary, by coiling the pipe, or by making expansions upon it of various forms, constituting water-stoves.

To avoid the necessity of so large a surface, and such a mass of water as is required at the low temperature the water attains in the pipes of this kind of apparatus, the high-pressure system was introduced. In this the pipe is made comparatively small, but very strong, and is formed into an endless circuit cut off from the atmosphere. The water is heated by making a number of coils of the pipe itself pass through the furnace; and as the whole circuit forms a shut vessel, as it were, the temperature may be raised to 300° and upward, according to the strength of the pipes. This high temperature causes a rapid circulation. A compendious specimen of the apparatus, calculated for a house of three stories, is presented in the accompanying engraving. In filling the tube with water, which enters at *b*, care is taken to expel all the air; and at *a* there is an expansion of the tube, equal to 15 or 20 per cent. of the capacity of the whole, which is left empty both of water and of air, to allow for expansion of the water when heated. The arrangement of the pipe may be various: the plan generally followed is to place a considerable coil of it within a pedestal or bunker, with open trellis-work in front, in a convenient part of the room. It may be made also to wind round the room, behind the skirting-board, which, being perforated with holes, will allow the entrance of the warmed air.



Hot-air Furnace.—This system is an excellent one when properly carried out. The fire warms the exterior of a system of flues or pipes of wrought or cast iron. The pipes are cased in a chamber of masonry or sheet-iron. From the chamber pipes of large area (30 sq. in. or more) are carried to the places to be heated. The chamber communicates also by a large flue, the air-box, with the open air. In action the furnace, which must be at the lowest point in

the structure, is heated by a coal or wood fire. The air heated rises from its casing through the flues to the rooms above it, and fresh air from outside enters by the air-box, to be heated and delivered as the first was. Thus a constant stream of fresh warmed air is delivered to the apartments. A very usual practice is to have a small water-tank to supply moisture to the air.

Indirect Radiation.—The hot-air furnace heats by what is called indirect radiation. If we substitute for the furnace a set of steam or hot-water pipes within the air-chamber of brick or iron, leaving the other arrangements as above described, we have one of the most approved systems of steam or hot-water heating—one which does not heat the same air over and over again, but which delivers fresh air continually into the rooms.

Conservation of Warmth.—The art of warming embraces not only the production and distribution of heat, but the construction of apartments with a view to prevent its escape. The way to effect this—setting aside meanwhile the necessity of renewing the air—is, in the first place, to make the walls, floor, windows, doors, etc., as impervious to air as possible, to prevent the heat from being carried off by currents; and in the next place, to make them poor conductors of heat. For this last purpose, the walls ought to be sufficiently thick, and, if possible, of non-conducting materials. Solid iron would make a cold wall; wood, a warm one; and in this respect brick or porous stone is preferable to hard stone. But the chief element for a warm wall is that it be *double*, which every wall in effect is when it is lined by a coating of plaster, kept apart from the wall itself by the laths. The plate of confined air between the two is the most effectual barrier to the passage of the heat outward. By making iron walls double or cellular, with a lining of plaster, they might be prevented from discharging the heat. Windows are a great source of cold, not so much by admitting cold air as by allowing the heat to pass by conduction through the thin glass. The air of the room that touches the window is robbed of its warmth, and is constantly descending in a cold stream toward the floor: thus a cold influence is felt from a window, however tight it is. This is partly arrested by window-blinds, shutters, and curtains, which check the flow of the air, and retard its carrying power. But a far more effectual plan is to have double windows—either two frames, or double panes in the same frame. The loss of heat by a double window is said to be only one-fourth of that by a single. Double windows are considered essential in countries where the winters are rigorous. They necessitate extra provision for ventilation. It is evident that we might succeed in nearly imprisoning the heat, and thus produce a house of ideal perfection, as concerns mere temperature. But for the habitation of living beings, another condition, seemingly antagonistic to the former, is no less requisite—'air as free as that on a mountain-top.' In general practice the two conditions are sought not so much to be reconciled as compromised; and then, as usual, neither object is well attained.

Circulation of air is got accidentally, through the imperfections of structure in our rooms—through the chinks and bad fittings of the windows, doors, floors, and the uneconomical fashion of our fireplaces. Were houses much better constructed than they are, the inmates would in many cases be suffocated outright, as they now often partially are. The airing of houses should not be left to chance, but be in every case secured by special ventilating apparatus capable of direct control.

VENTILATION.—The necessity of constantly renewing the air wherever living beings are breathing arises chiefly from the effects produced on air in the lungs (see RESPIRATION). The average quantity of carbonic acid in expired air or breath is found to be 4·3 per cent. by measure. Now this gas, when taken into the lungs, is a poison, and tends to arrest the vital processes. Like other poisons, however, it can be rendered harmless by *dilution*. The small proportion naturally existing in the atmosphere is perfectly innocuous, and may be considerably increased without sensible effect. But it is decidedly prejudicial to breathe for a long time air containing 1 measure in 100 of carbonic acid; and it is considered desirable that the proportion should never exceed 1 in 500. We may assume, then, what is near the truth, that 20 cubic ft. of air pass through the lungs of a man in an hour. To reduce the poison of this to 1 per cent., at which point it is barely respirable, it is requisite to mingle it with as much fresh air as will make a mixture of nearly 100 cubic ft.; and to make the dilution at all safe, it must be carried five times as far. In other words, the respiration of one human being vitiates hourly about 500 cubic ft. of air. In addition to carbonic acid, expired air contains an undue amount of watery vapor. Minute quantities of animal matters also are exhaled with the breath; and these in close ill-ventilated apartments form a clammy deposit on the furniture and walls, and, by putrefying, become organic poisons.

A further necessity for constant renewal of fresh air arises wherever lights are burning. The deteriorated air of a fire goes off by the flue, but lights are burned in many places where the products must mingle with the atmosphere of the apartment. Now, every cubic ft. of gas consumes the oxygen of 10 ft. of air, and forms at least 1 ft. of carbonic acid, besides watery vapor, sometimes mixed with sulphurous fumes.

To counteract these various sources of pollution, and keep the air fresh and wholesome, it is found in practice that on an average about 20 cubic ft. of fresh air per minute for each individual must be supplied. Ventilation consists of two operations—removal of foul air, and introduction of fresh air. Though neither operation can go on without the other, it is convenient to consider the two separately.

The agents employed in removing the air from apartments are chiefly two: that by which nature effects the ventilation of the earth on a grand scale—viz., the draught of ascending currents produced by difference of tempera-

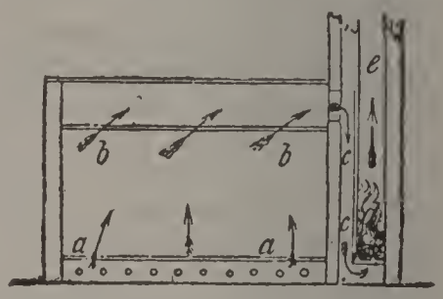
ture; and mechanical force, such as pumping. The former is the only one readily applicable in structures not of great size. The column of air in the chimney of a lighted fireplace, being expanded and comparatively light, exerts less than the prevailing pressure on the air immediately under and about its base: the air, therefore, below and around it pushes it up, and flows in to take its place; the velocity of the movement being in proportion to the height of the chimney and the degree of heat. Thus, though it is often convenient to speak of the air being *drawn* or *sucked* into the chimney, the force does not lie in the chimney, but in the greater pressure of the air behind. Wherever, then, there is a heated chimney, there is a means of removing the foul air. And in rooms moderately lofty and spacious, with windows and other fittings not closer than usual, and a chimney-mouth of the usual width, there is practically no risk, when there is no throng of inmates, of any serious vitiation of the air. The heated breath that ascends to the ceiling has time to diffuse itself gradually, and to be drawn in a diluted state into the currents setting from all quarters toward the chimney. These currents, however, are one great objection to this mode of ventilation, as they consist in great part of cold air that has just entered by the doors and windows, and are strongest where the inmates sit to enjoy the fire.

The ascent of foul air to the top of the room dictates its exit in that direction, rather than low down at the mouth of the chimney. It is conceived by some that the carbonic acid of the breath, from its greater weight, must be chiefly at the bottom of the room; but this is a mistake. The heated breath ascends instantly, because it is, as a whole, lighter than the air around it; and the carbonic acid in it does not tend to separate from it and fall down by its superior weight, but, by the law of the diffusion of gases, seeks to spread itself equally all over the room, and would do so though it were lying at first on the floor. Therefore a ventilating-valve has been contrived, as a desirable supplement to the open-fire draught in small and crowded apartments, and as an essential for healthfulness where the fire is burned in a stove or a closed grate. An aperture is cut in the wall over the chimney, as near the ceiling as convenient. In this aperture is suspended a valve, capable of opening inward to the chimney, but not outward to the room, by which means a return of smoke is prevented. The valve is so balanced on its centre of motion that it settles in the closed position, yet is easily opened. Where there is good chimney-draught, a flap of 36 sq. in. is sufficient for a full-sized room with company. This apparatus may be painted or otherwise made ornamental. It operates by virtue of the draught in the chimney. Whenever that is active from the presence of a fire, the valve is seen to open inward, and a stream of air from the top of the apartment passes through into the chimney: the operation is equivalent to the stream of air always passing into a chimney between the fire and the mantelpiece, but has the great superiority of draining off the most impure air in the room.

A wire descends to a screw or peg fixed in the wall by which the opening of the valve may be limited or altogether prevented. This is a far more efficient plan of ventilation than an open window, or an opening in the wall near the roof, leading merely to the outer air; for where there is an open fire in the room, such openings rather admit a rush of cold air than let out the foul.

There is often more or less draught in a chimney even without a fire, from the air within being slightly warmer than that without; and this action might be strengthened or procured by burning a jet of gas within the ventilating-aperture. Where a house is to be built new, it is advantageous to have special ventilating-flues in the walls, separate from but close to the fire-flues, so that the air may be heated, and an ascending current produced. When fires are not required, the draught can be maintained by gas-jets at the entrances to the vents. This plan of causing a draught by gas is applicable to apartments without fire-places. Where a fire is burned for the express purpose of producing a current of air, it is called ventilation by *fire-draught.* The plan has been successful in mines.

Many of our large buildings are ventilated by fire-draught. The figure shows an arrangement by which a school, church, or public hall may be ventilated: *aa*, the flooring perforated with holes, through which air, warmed by hot-water pipes, passes to the interior. The ceiling, *bb*, is perforated, leading to a chamber which communicates with a vertical flue, *cc;* which leads to the fireplace of the warming-apparatus, situated at the foot of a flue, *ed.* As the only air which reaches this must pass from *cc*, a constant current is maintained therein, also through the apertures in the ceiling.



In many instances the apparatus provides as well for admission as for removal of air. In ordinary dwellings no special provision is in general made as to admission. It is, in fact, not absolutely necessary; for the removal of a portion of the air of a room never fails to secure the entrance of a fresh supply somewhere. Whenever the chimney-draught or other means removes a little of the pressure inside the room, the pressure without forces air through every opening and chink; and even, were there no actual openings, would force it through the porous substance of the structure. But this irregular source of supply has various inconveniences. It often requires more force to strain the air in this manner than the draught possesses, and then the chimney smokes; it is smoke produced by this cause that is curable by opening the door or window. Another and great objection is, that impure air is often thus drawn into rooms from the lower parts of the building and from drains about the foundation. Therefore there ought in all cases to be a free though controllable

entrance provided for fresh air; and this entrance should be independent of the windows. It is disputed as to where in a room the air should be made to enter—some advocating openings for it near the floor, others near the ceiling; and neither method has yet been rendered unobjectionable. One essential is, to prevent the air from rushing in with a strong current, by passing it through minute holes spread over a large space. A tube, e.g., may lead from the outer air to a channel behind the skirting, or behind the cornice, and the air be allowed to enter the room through minute holes, or through a long, narrow, and concealed opening covered with perforated zinc or wire-gauze: the passage or tube leading from outside the wall can be more or less closed by a valve regulated from the inside.

Ventilation by Fans and Pumps.—The fan-wheel has been for many years used in factories, to which particularly it is applicable as being readily kept in motion by the engine. The air is drawn in at the centre of the wheel, and flies off at the circumference by centrifugal force. The fan is placed at the top of a flue, into which branches from all parts of the establishment proceed; and when it is set in motion, it draws off the air from every apartment communicating. To obviate waste of power by 'wire-drawing' the air—i.e., by making it squirt through small valves or other narrow openings—a ventilating-pump has been invented, requiring no other motive-power than the descent of the water used in the establishment from a high reservoir to the lower parts of the building.

Transference of Heat from the Used Air to the Fresh.—This is the kind of economy practiced in the Respirator (q.v.) and in the Caloric Engine (q.v.). Whatever difficulties—or impossibilities, as some maintain—there may be in the way of turning this transferred heat into a fresh source of power, nothing seems simpler, in theory at least, than to economize heat in this manner for the warming of dwellings and similar purposes. We are not aware that the principle has been developed in practice; but the possible economy of heat is obvious, and it requires only mechanical ingenuity to realize it.

It is evident how desirable it would be to do the same with the impure heated air which should be ejected from dwellings. Where the ventilation depends on the draught of a common chimney, it seems impossible to bring the entering air in contact with that which is escaping; but where the mechanical force of a pump or a fan is employed, nothing seems simpler than to make the two currents run counter to one another for a certain distance in close contact through a system of tubes. The smoke even, which, with the most economical arrangements, still issues from the flues at a temperature considerably above that of the building, might be drawn into the current with the foul air of the apartments, and the whole reduced nearly to the temperature of the atmosphere before being allowed to escape. Of course there must be loss in the transference; but a large percentage would be saved, and the consumption of fuel would be reduced by that amount. Were this

'double-current ventilation' applied to churches, ball-rooms, theatres, etc., where thousands of persons are assembled, Dr. Arnott believed that 'no other heating apparatus would be required but the lungs of the company.'

Public Heat Supply.—It is evident that household fire heat is manufactured on a very small scale; and experience has proved that the cost of production of an article is always inversely proportionate to the scale of its manufacture. Accordingly it has been suggested to supersede domestic fires, and to lay on heat (heated air or steam), or the means of generating heat (low-priced gaseous fuel) to houses much as we now lay on gas. The public supply of heat to houses through a system of steam-pipes laid in the streets—the steam being generated at a great central boiler provided for each local district—has been introduced and is in operation in some cities in this country. It has been proposed, further, to abate the smoke nuisance and effect thorough ventilation on a similar joint-plan, by connecting the chimneys of all the houses with underground culverts, provided at intervals with high shafts, in which, if necessary, the draught upward might be increased by furnaces. It has been suggested that we have long been familiar with extensive manufactories, covering large areas, in which are very numerous fires, all in communication with a single lofty chimney; and that in building a new street it might easily be made to empty its entire smoke through the medium of a single tall tower resembling mediæval campanili seen in Bologna and other Italian cities.

WARMINSTER, *wawr'mĭn-stĕr:* ancient town of Wiltshire, England; on the w. border of Salisbury Plain; 19 m. n.w. of Salisbury, 105 m. s.s.w. of London by rail. The parish church dates from the reign of Henry III.; and there are numerous interesting edifices in the town and neighborhood. An important corn-market is held every week.—Pop. 5,600.

WAR'MOTH, Henry Clay: American politician and soldier: b. McLeansboro, Ill., 1842, May 9. He was admitted to the bar in 1861 and became district attorney of the 18th judicial district of Missouri in 1862, but resigned to enter the Union army. He was appointed lieut.-col., was engaged in the assaults on Vicksburg in 1862, May 19-22, and was present at the battles of Lookout Mountain and Missionary Ridge. He served in the Texan campaign and was afterward judge of the military court of the Department of the Gulf until the close of the war. He became military governor of Louisiana in 1868 and was inaugurated civil governor upon the adoption of its new constitution, an office he occupied until 1873. He was a member of the Louisiana legislature in 1876-7 and collector of customs at New Orleans in 1889-93. He was one of the builders of the New Orleans, Fort Jackson & Grand Isle railroad, of which he is president.

WARN, v. *wawrn* [AS. *warnian*, to warn, to take heed —from *wearn*, an impediment, an obstacle: Icel. *varna*, to forbid, to refuse: connected with the root *ware*, to look or take notice]: to give notice to; to cause one to take notice; to put on guard against danger; to admonish of any duty; to caution. WARN'ING, imp.: N. caution against danger; previous, as from landlord to tenant to quit a house, etc. WARNING, in *Scotch law*, notice to the effect that the relation of master and servant, or of landlord and tenant, will terminate at a specified time; corresponding respectively to the *notice to leave* and *notice to quit* of other jurisdictions. WARN'INGLY, ad. WARNED, pp. *wawrnd*.

WARNER, CHARLES DUDLEY: American editor and author: b. Plainfield, Hampshire co., Mass., 1829, Sept. 12; d. Hartford, Conn., 1900, Oct. 20. Graduated from Hamilton College in 1851 and from the law school of the University of Pennsylvania in 1856, he was admitted to the bar in the latter year at Philadelphia, and practiced his profession at Chicago in 1856-60. In 1860 he became assistant editor of the Hartford (Conn.) *Evening Press*, and in 1861 its editor-in-chief. This newspaper was consolidated in 1867 with the *Courant*, a morning journal, and Warner was a part owner and long assistant editor of the latter, though eventually his connection with the paper was largely that of a literary contributor. Some letters of travel in America and Europe in 1868-9, printed in the *Courant*, were widely copied, and his articles published in book form in 1870 as *My Summer in a Garden*, placed him high in the list of American humorists. From 1884 to 1892 he was in charge of the *Editor's Drawer* department of *Harper's Magazine*, and in 1892 was transferred to that of the *Editor's Study* in the same magazine. He was particularly successful in the essay, in which he combined shrewd observation and cultured humor in a manner in many ways resembling that of Washington Irving. He was a discerning critic as well; and in addition to his literary activities was identified with various philanthropic works. His further publications include: *A Book of Eloquence* (1853); *Saunterings* (1872); *Backlog Studies* (1872); *The Gilded Age* (with S. L. Clemens, 1873); *Baddeck, and That Sort of Thing* (1874); *Mummies and Moslems* (1876—reissued as *My Winter on the Nile*); *In the Levant* (1877); *Being a Boy* (1877); *In the Wilderness* (1878); *The American Newspaper* (1879); *Studies of Irving* (with W. C. Bryant and George P. Putnam, 1880); *Life of Washington Irving* (1881); *Captain John Smith, Sometime Governor of Virginia, and Admiral of New England: A Study of His Life and Writings* (1881); *A Roundabout Journey* (1883); *Papers on Penology* (with others, 1886); *Their Pilgrimage* (1886); *On Horseback; A Tour in Virginia, North Carolina, and Tennessee, Published with Notes of Travel in Mexico and California*

(1888); *Studies in the South and West, with Comments on Canada* (1889); *A Little Journey in the World: A Novel* (1889); *Looking Forward: The Duel Government Realized* (1890); *Our Italy, Southern California* (1890); *As We Were Saying* (1891); *Washington Irving* (1892); *The Work of Washington Irving* (1893); *As We Go* (1893); *The Golden House: A Novel* (1894); *The Relation of Literature to Life* (1896); *The People for Whom Shakespeare Wrote* (1897). He also edited the *American Men of Letters* series and *A Library of the World's Best Literature* (1896-8).

WAR'NER, Olin Levi, sculptor; b. Suffield, Conn., 1844, Apr. 9; d. 1896, Aug. 14. In early life he was a telegraph operator, but in 1869 went to Paris and for three years studied under François Jouffroy at the Ecole des Beaux Arts. In 1877 he was elected a member of the Soc. of Amer. Artists, and 1888 an associate of the National Acad. Among his works are *Diana, Dancing Nymph,* statuettes of *May* and *Twilight,* and a portrait statue of William Lloyd Garrison.

WAR'NER, Seth: soldier: 1743, May 17—1784, Dec. 26; b. Roxbury, Conn. He removed to Bennington, Vt., 1765; became a leader of the people in the disputes with New York concerning the 'New Hampshire Grants,' and was outlawed by New York. He served in the revolutionary army; was second in command to Ethan Allen in the capture of Ticonderoga and commanded the forces that took Crown Point two days later—for this service congress commissioned him a col.; he accompanied Montgomery's expedition into Canada; commanded at the sharp engagement at Hubbardton; took part in the battle of Bennington, repelling the reinforcements of the enemy. He remained in the service until 1782, when failing health compelled him to resign his commission. He returned to Roxbury, Conn., where he died.

WARNER, Susan: American author: b. New York 1819, July 11; d. Highland Falls, Orange co., N. Y., 1885, Mar. 17. For a number of years she resided on Constitution Island in the Hudson river, opposite West Point. Her first essay in literature was a novel entitled *The Wide, Wide World,* published in 1850 under the pseudonym of Elizabeth Wetherell. This book was in its day next to *Uncle Tom's Cabin* the most successful work of fiction in America in point of sales, and was popular also in Europe. In cheaper editions it still finds readers. It was mediocre in style and unduly pietistic in its manner; and, says Richardson, 'all literature cannot show so lachrymose a book.' It was succeeded by *Queechy* (1852), which had also a large circulation, and *The Hills of the Shatemuc* (1856), containing many glimpses of American scenery. She was also the author of *The Law and the Testimony* (1853), in which the texts proving the great doctrines of Christianity are brought together under their

appropriate heads; *The Old Helmet* (1863); *Melbourne House* (1864), and other works.

WARP, v. *wawrp* [Goth. *wairpan;* AS. *weorpan;* Icel. *verpa;* Ger. *werfen,* to throw, to take a certain turn: Icel. *varpa,* to cast or lay out a net]: to cast; to throw; to give a cast or twist to; to twist or be twisted out of a straight direction; to turn from a straight or proper course; to turn aside from the true direction; to pervert; to prejudice; to tow or move, as a ship to a place by means of a rope laid out for that purpose and fastened to an anchor; to inundate low-lying lands for the purpose of fertilizing them with the earthy matters held in mechanical solution by the water. (It is practiced in some valleys of the Alps; and the rich soil brought down from the mountains is thus arrested and made to increase the fertility of fields. It is also practiced on a large scale in England.) To drop young prematurely, applied to cattle: N. the long threads laid out parallel to each other between which the woof is shot in weaving; the threads lengthwise in a woven fabric, the cross ones being called the *woof* or *weft;* a rope laid out for the purpose of mooring a ship; a tow-line; muddy deposit *cast* from waters artificially introduced over low lands. WARP'ER, n. *-ėr,* one who prepares the warps of webs for weaving. WARP'ING, imp.: N. act of one who or that which warps; a turning aside from the true direction. WARPED, pp. *wawrpt.* WARP'AGE, n. *-āj,* the act of warping.

WARRANT, v. *wŏr'rănt* [OHG. *warjan;* Ger. *wehren,* to protect: Low Ger. *warent,* one who gives security: OE. *warant,* a protector: OF. *guarant,* one who makes safe: OHG. *wara,* care (see also WARY)]: to protect; safeguard; secure; to guarantee against harm or the like; to give a pledge or assurance in respect of something, as that goods sold are genuine and of the quantity, quality, etc., represented; to authorize; to justify; to maintain by authority; to assure; to declare with confidence: N. written document conferring some right or authority; that which authorizes or justifies an act; that which vouches for or insures anything; attestation; guarantee; right; legality; authority; authorization: legal instrument, sometimes called a *writ,* issued by a judge, justice of the peace, or the like, enjoining or authorizing the person to whom it is addressed to seize or detain the person, persons, or things specified in it, or to do some other specified act, as to search a house, a ship, etc. (see WARRANT OF ARREST). WAR'RANTING, imp. WAR'RANTED, pp. WAR'RANTER, n. *-ėr,* one who warrants. WAR'RANTOR', n. *-ănt-ŏr',* one who warrants, as opposed to WAR'RANTEE', the person to whom title or the like is warranted. WAR'RANTABLE, a. *-ă-bl,* authorized by commission or right; justifiable; defensible. WAR'RANTABLY, ad. *-blĭ.* WAR'RANTABLENESS, n. *-bl-nĕs,* the quality of being warrantable or justifiable. WAR'RANTIZE, n. *-īz,*

in *OE.*, authority; security: V. in *OE.*, to warrant. WAR'RANTY, n. *-i*, a guarantee; a security; an engagement, expressed or implied, that certain things or facts are or shall be as they have been represented or promised to be (see below): in *insurance law*, certain stipulations or engagements by the party insured; in *OE.*, authority; guarantee: V. to guarantee. WARRRANT-OFFICER, a non-commissioned officer acting under a warrant from a govt. department, or considered as so acting, instead of acting under commission from the chief executive power: such officers in the navy are gunners, boatswains, carpenters, and sail-makers (see NON-COMMISSIONED OFFICERS, in the Army). SEARCH-WARRANT, written document authorizing a person to enter a house, a shop, etc., usually for stolen goods. DOCK WARRANT, a custom-house license or authority.

WARRANT OF ARREST: legal instrument, sometimes called a *writ*, issued by a justice of the peace or other authorized officer for the capture, apprehension, or arrest of a person on a criminal charge: seizure of a person on a writ in a civil cause is an 'arrest,' and the writ is a 'Warrant of arrest,' or an 'order of arrest.' The term arrest is, however, generally used for capture of a person on a charge of any kind, by an authorized officer: see ARREST, in Law. The Warrant must be dated and bear the signature and seal of the justice or other officer issuing it; and a general Warrant—i.e., a Warrant to arrest all persons suspected, without naming or describing any individual—is illegal and void for uncertainty—vague suspicion not being enough to deprive any man of his liberty. By the federal constitution a warrant may not issue except upon 'probable cause supported by oath or affirmation.' *Warrant of attorney* in Law is an instrument in writing addressed to one or more attorneys therein named, authorizing them generally to appear in any court or in some specified court on behalf of the person executing it, and to confess judgment in favor of some particular person therein named, in an action of debt, and usually containing a stipulation not to bring any writ of error, take an appeal or file a bill in equity, so as to delay him.

The warrant should contain the grant of an authority clearly given, and the designation of a person by whom it is to be exercised, either by name or description. Ordinarily it is given to 'any attorney' of some court or in a particular state or country. It should also state the cause of action, or it may be set forth in a declaration, statement or instrument annexed to the warrant.

The warrant is revocable when it is unsupported by any consideration or not given as a security for a debt or to render a security effective; but in these cases it is irrevocable. It need not be under seal. The person in whose favor the warrant is given has all the benefits of a judgment against the debtor, without being delayed by

any intermediate proceedings as in the case of a regular suit.

In some states of the United States judgment by confession on warrant of attorney is not allowed. In others a judgment on warrant of attorney is not final, but must be confirmed by the court before becoming effective.

It is not ordinarily requisite that a complaint or declaration be filed, and in many cases it is sufficient if judgment be entered upon the warrant of attorney, either in term time or in vacation by the clerk of the court. In most jurisdictions a judgment can only be rendered and become effective when pronounced by a court in session. The mode of procedure upon a warrant of attorney is, in most jurisdictions, regulated by statute, and such statutes must be followed or the judgment entered upon the warrant of attorney will be void.

WAR'RANTY, in Law: a promise or covenant to warrant or secure against all men in a certain person the enjoyment of the thing granted or sold to him. As applied to ordinary sales of things personal, Warranty is used to secure the truth of certain representations which the purchaser has no means, or has imperfect means, of ascertaining, yet whose knowledge is material to the contract. A warranty is either express or implied, it is express when quoted by the express representations or statements of the seller, it is implied when the law derives it by implication or inference from the nature of the transaction or the relative situation of the parties. The law does not imply on the part of the seller of an article in its natural state, who has no better means of information than the purchaser, and who does not affirm that the article is fit for any particular purpose, any warranty or undertaking beyond the ordinary promise that he makes no false representation calculated to deceive the purchaser, and practices no deceit or fraudulent concealment, and that he is not cognizant of any latent defect materially affecting the marketable value of the goods. In the ordinary sale of a horse, the seller warrants it only to be an animal of the description that it appears to be, and nothing more; and if the purchaser makes no inquiries as to its soundness or qualities, and it turns out unsound and restive, or unfit for use, he cannot recover as against the seller, as it must be assumed that he purchased the animal at a cheaper rate. And on the sale or transfer of wares and merchandise, if nothing is said as to the character or quality of the thing sold, the buyer takes the risk of all latent defects unknown to the seller at the time of the execution of the contract of sale; all that the seller answers for being that the article is, as far as he knows, what it appears to be. Whenever a man sells goods as owner, he impliedly undertakes and promises that the goods are his own goods, and that he has a right to make the sale and transfer which he professes to make; and if he was not the owner, he is responsible in damages if

the real owner claims them from the purchaser. If the purchaser does not himself inspect and select the subject-matter of sale, the seller impliedly warrants the article that he sells to be the very article that the purchaser has agreed to buy, and is responsible in damages if he furnishes a different article. If the vender is told that the article is wanted for a specific purpose, then he is taken to warrant impliedly that the article furnished is adequate for that purpose. Every victualer or dealer in provisions impliedly warrants them to be wholesome and fit for food. But a private person who does not trade in provisions is not responsible for selling an unwholesome article of food without fraud and in ignorance that it is unfit to eat. Where buyer and seller have equal means of knowledge, then the vender is not liable for any representation which he makes without fraud; but if, from the nature of the case, the vender has the exclusive means of knowledge, then he impliedly warrants that what he says is true. Warranty is also to be distinguished from mere matter of opinion or belief. When a servent or employé sells a horse, he has no right to give a Warranty, unless his employer expressly authorized him to do so.

WARRAY, v. *wŏr′rā* [from *war*]: in *OE.*, to make war upon. WARRAYD, or WARRAID, pt. in *OE.*, made war upon.

WARRE, a. *wawr* [AS. *wærra*]: in *OE.*, worse.

WARREN, n. *wŏr′rĕn* [OF. *warenne*, a place where animals are kept—from mid. L. *warenna*, a warren or preserve—from OHG. *warjun*, to protect (see WARRANT)]: a piece of ground for the breeding and preservation of rabbits; a place frequented by rabbits; a place for keeping fishes in a stream. WAR′RENER, n. *-ėr*, the keeper of a warren.

WARREN, Ill.: village in Jo Daviess co.; on the Illinois C., and the Chicago, M. and St. P. railways; about 26 m. e. by n. of Galena and 25 m. n.w. of Freeport. It is in an agricultural and stock-raising region, and near the lead mines of the Galena district. A good quality of tobacco is grown in the vicinity. The chief industrial establishments are flour mills, creameries, and tobacco factories. The village has a high school, graded schools, a public library, and a state bank. Pop. 1,700.

WARREN, Ind.: town in Huntington co.; on the Salamonie river, and on the Toledo, Saint Louis and Kansas City railway; about 75 m. n. by w. of Indianapolis and 15 m. s. of Huntington, the county-seat. It is in a region of good farm lands and in a natural-gas and petroleum belt. The chief manufacturing establishments are flour and lumber mills, cooperage, and machine shop. There are large shipments of hay, grain, and live stock. Pop. 1,500.

WARREN, Maine: town in Knox co.; on Saint George's river, and on the Maine Central railroad; 60 m.

n.e. of Portland. It was first permanently settled in 1736, though it was known as a trading post as early as 1631; it was incorporated as a town in 1776. There are large deposits of limestone in the town; and the river affords power for manufacturing; the town contains cotton and shoe factories, and a powder mill. There is a public high school. Pop. (1900) 2,069; (1910) 1,812.

WARREN, Mass.: town in Worcester co.; on the Chicopee river, and on the Boston and Albany railroad; 18 m. w. of Worcester. It includes the villages of Warren and West Warren. It was first settled in 1731, and in 1741 was incorporated as a town under the name of Western. In 1834 the name was changed to Warren. It contains cheese factories, cotton and woolen mills and manufactories of steam pumps and engines. It has a public high school, established in 1870, and a public library of about 10,000 volumes (1904) founded in 1876 by a library association. Pop. (1910) 4,188.

WARREN, Ohio: city, county-seat of Trumbull co.; on the Mahoning river, and on the Pennsylvania, the Erie, and the Pittsburg and W. railways; about 50 m. s.e. of Cleveland and 15 m. n.w. of Youngstown. It is a region where much of the land is good for farming, but the chief industries of the city are connected with manufacturing iron products. Some of the principal manufactures are rolling mill products, flour, lumber products, automobiles, tubing, bath tubs, electric lamps, foundry and machine-shop products. In 1900 (government census) there were 110 manufacturing establishments, capitalized for $2,952,697, and employing 2,081 persons to whom was paid annually the sum of $997,455. The principal public buildings are the county court-house, the municipal buildings, churches, and schools. There are a high school, public graded schools, and a public library containing about 10,000 volumes. There are five banks, capitalized for $500,000 and having deposits amounting to $2,949,940. Warren was founded in 1799; incorporated in 1834. Pop. (1900) 8,529; (1910) 11,081.

WARREN, Pa.: borough, county-seat of Warren co.; on the Allegheny river, and on the Pennsylvania, the Western, N. Y. and P., and the Dunkirk, A. V. and P. railways; about 120 m. n.e. of Pittsburg and 20 m. s. of Chautauqua Lake, N. Y.; long. 79° 15′ w., lat. 41° 50′ n. It is in an agricultural and oil region, but the chief industries are connected with oil products and manufacturing. The principal manufacturing establishments are iron works, lumber mills, oil and gas engine factories, boiler works, piano factories, and furniture factories. Other manufactures are wood alcohol, oil and the by-products, glue, barrels, machinery used with oil wells and for manufactories. In 1900 (government census) there were 119 manufacturing establishments, capitalized for $2,869,020, and employing 1,270 persons to whom was

paid annually the sum of $585,590. The raw material used cost $2,357,681, and the value of the total annual products was $4,152,859. The principal public institutions are the county court-house, the State Hospital for Insane, the churches and educational institutions. There are 15 churches, representing seven different denominations. There are seven public schools, one Roman Catholic parish school, four private schools, a public library, containing about 12,000 volumes. The five banks have a combined capital of $575,000 and deposits amounting to $4,534,350. The government is administered according to the Pennsylvania statutes for boroughs, which provides for a burgess and a council of 14 members who hold office three years.

Warren was settled in 1795 by Daniel McQuay, and was incorporated in 1832. The village of Gade was annexed in 1895. There are a large number of foreign-born inhabitants, chiefly Germans and Scandinavians. Pop. (1900) 8,043; (1910) 11,080.

WARREN, R. I.: town in Bristol co., on the Warren river and Narragansett Bay, and on the New York, New Haven and Hartford railway; 10 m. s.e. of Providence. It was the old Indian town of Sowamset; a trading post was established there by white men as early as 1632, but permanent settlement was later. It was in the territory in dispute between Rhode Island and Massachusetts, and originally formed a part of the town of Swansea, Mass.; after the boundary was settled and Warren came under the jurisdiction of Rhode Island it was incorporated as a town (1747); in 1770 the town of Barrington was separated from it. From 1764-70 it was the seat of the College of Rhode Island (now Brown University). During the revolutionary war the town was pillaged by the British, and a number of houses burned. It is now largely a manufacturing town, its manufactures including cotton goods, braid and twine. It has a public high school, and the George Hall Free Library. Pop. (1910) 6,585.

WARREN, Sir Charles: British general: b. Bangor 1840, Feb. 7. He received a military education at Sandhurst and Woolwich, joined the Royal Engineers in 1857, and in 1861-5 was engaged in a survey of Gibraltar. During the three years following 1867 he carried out exploring work in Palestine for the Palestine Exploration Fund, and in 1876 was a commissioner for settling the western boundary of the Orange Free State. He commanded the Diamond Fields Horse in the Kaffir war of 1878, and during the immediately succeeding Griqua and Bechuana campaign was commander of the field force. He returned to England in 1880, and during the next four years was attached to the Chatham school of military engineering as instructor in surveying. He commanded the Bechuanaland expedition of 1884-5, and was in command at Suakim. From 1886 till his resignation

in 1888 he was chief commissioner of the metropolitan police of London, and for five years from 1889 was in command of the troops in the Straits Settlements, with the temporary rank of major-general. He was commander of the Thames district 1895-8; commanded a division in the South African war of 1899-1902, and co-operated with Sir Redvers Buller in that attempt to relieve Ladysmith with which the occupation of Spion Kop is prominently associated. He was afterward appointed military governor of Griqualand West. He has published *Underground Jerusalem* (1876); *The Temple of the Tomb* (1880); and with C. R. Conder, *Jerusalem* (1884).

WARREN, Francis Emroy: American legislator: b. Hinsdale, Mass., 1844, June 20. He served in the civil was as a non-commissioned officer in 1862-5 and received a congressional medal for gallant conduct at Fort Hudson. He removed to Wyoming in 1868, became active in politics, was a member and president of the council, mayor of Cheyenne, treasurer of the territory, and in 1885-6 was governor. In 1889 he again became governor and upon Wyoming's admission to statehood in 1890 was elected first governor of the state; before the expiration of his term, however, he was elected to the United States senate.

WARREN, Frederick Morris, ph.d., l.h.d.: American philologist: b. Durham, Maine, 1859, July 9. He was graduated from Amherst in 1880 and engaged as instructor in modern languages at Johns Hopkins in 1886-91. In 1891-1901 he was professor of Romance languages at the Western Reserve University, and since 1901 has been professor of modern languages at Yale. He has published: *A Primer of French Literature* (1889); *History of the Novel Previous to the Seventeenth Century* (1895), etc.; and has also edited: *Selections from Victor Hugo* (1893); French Prose of the Seventeenth Century (1899); Lamartine's *Graziella* (1900); and *Racine* (1903); etc.

WARREN, Gouverneur Kemble: American military officer: b. Cold Springs, N. Y., 1830, Jan. 8; d. Newport, R. I., 1882, Aug. 8. He was graduated from West Point in 1850, was assigned to the engineering corps, and until 1859 was engaged in making river and railway surveys between the Mississippi river and the Pacific Ocean. He was assistant professor of mathematics at West Point from 1859-61, when he became lieutenant-colonel and later colonel and captain of volunteers. For service at Gaines' Mills in 1862 he was promoted brigadier-general, and he became chief of topographical engineers in 1863, rising to chief of engineers in the Army of the Potomac in that year. He was on the staff of Gen. Meade at the battle of Gettysburg, where on July 2 he seized and held Little Round Top, the key to the federal position. He was promoted major general of volunteers in 1863, May,

and in 1864 assumed command of the Fifth corps in the Army of the Potomac. He was subsequently placed in command of the Department of the Mississippi and in 1865 was mustered out of the volunteer service as brevet brigadier-general of regulars. He continued in the army, engaged in various surveys, and in 1879 was promoted lieutenant-colonel. A statue was unveiled to his memory on Little Round Top, Gettysburg, 1888, Aug. 8. He published various reports and *An Account of the Fifth Army Corps at Five Forks* (1866).

WARREN, Henry Kimball, A.M., LL.D.: American college president: b. Cresco, Iowa, 1858, May 31. He was graduated from Olivet College in 1882, was principal of the public schools of Mount Pleasant, Mich., 1882-3, and of those at Hannibal, Mo., 1883-9. He was president of Gates College, Nebraska, 1889-94, of Salt Lake College, Utah, 1894-5, and has been president of Yankton College, South Dakota, from 1895.

WARREN, Henry White, D.D., LL.D.: American Methodist bishop: b. Williamsburg, Mass., 1831, Jan. 4. He was graduated from Wesleyan University in 1853 and in 1855 was admitted into the Methodist conference. He was engaged for 15 years in various pastorates in Massachusetts; served in the Massachusetts house of representatives in 1861-2; was pastor of the Arch Street church in Philadelphia in 1871-4, and in 1877-80; and in 1880 was elected bishop. He has traveled in almost all parts of the United States in the performance of his episcopal duties and visited Japan for inspecting the Methodist church missions in 1888. He edited *The Study* in 1896-1900, and has published: *Sights and Insights* (1874); *Recreations in Astronomy* (1879); *The Bible in the World's Education* (1892); *Among the Forces* (1898); etc.

WARREN, James: American Revolutionary leader: b. Plymouth, Mass., 1726, Sept. 20; d. there 1808, Nov. 27. He was graduated at Harvard in 1745, and for several years was engaged in mercantile pursuits at Plymouth. He was elected a member of the general court from Plymouth in 1766, was uniform in his support of the rights of the colonies, and remained in that assembly until it was dissolved in 1774. In 1772 he took a leading part in the establishment of committees of correspondence for the different colonies, a measure generally adopted. He became president of the Massachusetts provincial congress in 1775, was paymaster to the Continental army while it was at Cambridge, after the adoption of the Massachusetts state constitution was for several years speaker of the house, and held also a seat in the navy board.

WARREN, Sir John Borlase: English naval officer: b. Stapleford, Nottinghamshire, 1754; d. Greenwich 1822, Feb. 27. He entered the navy as midshipman and after

serving in that capacity for some time studied at Emanuel College, Cambridge, and took his degree in 1776. In 1774 he entered parliament as member for Marlow, and in 1775 was created a baronet. In 1793, on the commencement of the war with France, he was appointed to the Flora, frigate, and in 1795 commanded the expedition to Quiberon Bay to assist the insurrectionists of La Vendée, which was unsuccessful. In 1798, Oct. 11, he fell in with a French squadron off the coast of Ireland destined for the invasion of that country, and captured the Hoche line-of-battle ship and three frigates. For this he was subsequently made rear-admiral of the blue. He continued in the navy until the peace of Amiens, when he was made privy councillor and sent to Russia as ambassador extraordinary and minister plenipotentiary, and there managed some delicate negotiations with regard to the retention of Malta with great ability. On his return he again entered into service, subsequently became vice-admiral, and in 1812 received the chief command in North America and the West Indies. He is the supposed author of an anonymous work entitled *A View of the Naval Force of Great Britain* (8 vols., 1791).

WARREN, John Byrne Leicester, 3d Baron De Tabley: English poet: b. Tabley House, Cheshire, 1835, Apr. 26; d. Ryde, Isle of Wight, 1895, Nov. 22. He was educated at Eton and Oxford, was called to the bar, and after a short diplomatic experience, devoted himself to literature. His life was passed in retirement, although he was the personal friend of Tennyson, Browning, Gladstone, and other eminent men of his day. His poetry, which reveals many excellencies of style as well as depth of thought, appeals to the cultivated few, but not to the general public. His earliest work appeared with the signature 'G. F. Preston' (1857-62), and later he used the pseudonym 'William Lancaster.' After 1873 his work appeared with his own name, John Leicester Warren. In 1893 he published *Poems Dramatic and Lyrical by Lord De Tabley* which met with qualified success, and in 1895 a second series appeared. Among his other volumes of verse are *Prætorita* (1870); *Philoctetes* (1867); *Orestes* (1868); *Rehearsals* (1870); and *Searching the Net* (1873). He also wrote two novels, *A Screw Loose* (1868); *Ropes of Sand* (1869).

WARREN, Joseph: American patriot: b. Roxbury, Mass., 1741, June 11; d. Charlestown, Mass., 1775, June 17. He was graduated from Harvard in 1759, studied medicine with Dr. James Lloyd, of Boston, entered the practice of his profession in 1764, and from the time of the Stamp Act (1765) contributed to the press. On the occasion of the Townshend revenue acts, imposing duties on paper, glass, painter's colors, and tea, legalizing writs of assistance, and forming a board of customs, Warren printed in the Boston *Gazette* over the signature 'A True Patriot,' a letter which caused Governor Francis Bernard

to attempt the prosecution of the publishers on the ground that the article tended to bring the royal government into contempt. The attorney general began proceedings, but the grand jury refused to find a bill. In 1770 Warren was one of the committee of safety appointed after the 'Boston massacre' of March 5, and in 1772 he pronounced the memorial oration at the anniversary of that event. With Samuel Adams and James Otis he was recorded in 1772, Nov., as a member of the first committee of correspondence, and during the next two years busily co-operated with Adams. When the latter left Boston 1774, Aug. 10, to attend the meeting of the Continental congress at Philadelphia, Warren became the leading figure in Massachusetts political movements. When the towns of Suffolk co. assembled in convention at Milton 1774, Sept. 9, Warren read a set of resolutions, drawn up by himself and since known as the 'Suffolk resolves,' which declared that a king who has violated the chartered rights of subjects forfeits their allegiance; that the 'Regulating act,' which had deprived Massachusetts without a previous notice and without a hearing of most important rights and liberties, was null and void; and directed tax-collectors to refuse to pay the moneys collected to Gates' treasurer, warned Gates that if patriots were arrested for political reasons royal officers would be held as hostages, and counseled the towns to choose their own officers of militia. After the meeting of the Provincial congress in 1774, Oct., Warren was chairman of the committee of safety for collecting military stores, and organizing a militia, and in 1775, Mar. 5, delivered his second oration on the anniversary of the 'massacre.' He was unanimously elected president of the Provincial congress at its Watertown meeting, May 31, being thus made chief executive under the provisional government. On June 14 he was chosen second major-general of Massachusetts forces, and on June 17 went to Bunker (Breed's) Hill, where he told Putnam and Prescott that he had come to serve as a volunteer aide. At the final conflict near Prescott's redoubt he was shot and killed. Webster's apostrophe to him in the *Bunker Hill Oration* as 'the first great martyr in this great cause' is well known.

WARREN, Mercy Otis: American patriot: b. Barnstable, Mass., 1728, Sept. 25; d. Plymouth, Mass., 1814, Oct. 19. She was Mrs. James Warren, and James Otis was a brother. An ardent patriot, she corresponded with the leaders of the revolution, among them Samuel and John Adams, and Thomas Jefferson. She wrote some dramatic works which were included in her volume of *Poems, Dramatic and Miscellaneous* (1790). Of these attempts in drama the best is the metrical *Group*, satirizing British and Tory leaders. The chief of her writings, however, is the three-volume *History of the Rise, Progress, and Termination of the American Revolution, Inter-*

spersed with Biographical, Political, and Moral Observations (1805). Tyler admits the 'tone of undisguised partisanship ringing through the book,' but calls it a 'powerful delineation of a great period,' and says its character-sketches may still be found of interest.

WARREN, Richard Henry: American musician: b. Albany, N. Y., 1859, Sept. 17. He studied under his father and others in this country, and then (1880 and 1886) in Europe. In 1877-9 he was organist and director of music at the church of Saint John the Evangelist, New York, and in the same city has held similar positions at the Reformed Episcopal church (1879-80), All Souls' (Author Memorial) church (1880-6), and Saint Bartholomew's church (1886-1905). In 1889-96 and again in 1904 he was conductor of the Church Choral Society, during the same time conducting other organizations. Besides many church anthems and services, songs, etc., his compositions include *Igala* (1880); *All on a Summer's Day* (1882), and *Magnolia* (1896), operettas; *Phyllis* (1897), a romantic opera, produced at the Waldorf-Astoria theatre 1900, May 7-21; *Ticonderoga,* a string quartette; and a cantata.

WARREN, Samuel: English novelist: b. Denbighshire, Wales, 1807, May 23; d. London 1877, July 29. He studied medicine at Edinburgh and law at the Inner Temple, was called to the bar in 1837, and was made queen's counsel in 1851. He was recorder of Hull (1854-74), represented Midhurst in parliament (1856-9), and was appointed master in lunacy in 1859. His earliest work, *Passages from the Diary of a Late Physician* (1832), appeared in several editions in both England and the United States, but his most popular work was *Ten Thousand a Year* (1841), which was passed through many editions. It appeared in an abridged form in 1903. He published various other works, including *Now and Then* (1847); *The Lily and the Bee* (1851); and several law books.

WARREN, William Fairfield, d.d., ll.d.: American educator: b. Williamsburg, Mass., 1833, Mar. 13. He was graduated from Wesleyan University in 1853, ordained in the Methodist ministry in 1855, and for several years was professor of systematic theology at the Mission Institute, Bremen (now Martin Institute, Frankfort), Germany. In 1866 he became acting president of the Boston Theological Seminary, and from 1873-1903 he was president of Boston University, occupying, also, during that time, the chair of philosophy of religion and comparative theology. His writings include: *The True Key to Ancient Cosmology* (1882); *Paradise Found,* published also in Japanese, Chinese, Spanish, and German (1885); *The Story of Gottlieb,* translated into German and Arabic (1890) *Constitutional Law Questions in the Methodist Episcopal Church* (1894); *The Religion of the World and the World's Religion* (1900); etc.

WARRENSBURG, Mo.: city, county-seat of Johnson co; on the Black river, and on the Missouri Pacific railroad; about 65 m. s.e. of Kansas City. It is in a fertile agricultural region, and in the vicinity are large sandstone quarries. It has several mineral springs, noted for their medicinal properties. The springs and climate have much to do with making the city a favorite pleasure and health resort. The chief manufacturing establishments are flour mills, foundry and machine shops, wagon and carriage factories, and woolen mills. It has grain elevators, coal and stock yards. The city has the State Normal School for the second district, a high school, and graded elementary schools. The three banks have a combined capital of $100,000 and deposits amounting to $837,440. Pop. (1900) 4,724; (1910) 4,689.

WAR'RENTON, Va.: town, county-seat of Fauquier co.; on the Southern railroad; about 50 m. s.w. of Washington, D. C. It is in the region of the foot-hills of the Blue Ridge, and its picturesque scenery and cool climate in summer have made it a favorite summer resort. It has seven churches, a high school, Fauquier Institute, private select schools, a national bank and a private bank. The town has gravity waterworks. Pop. 1,697.

WARRINGTON, England: a manufacturing town in Lancashire, on the river Mersey and the Manchester ship canal, near the Sankey and Bridgewater canals, 15 m. e. of Liverpool. The Latchford locks are notable features of the ship canal at Warrington. The public buildings and institutions include: the restored parish church at St. Elphin, in Decorated style; other modern parish churches; Nonconformist and Roman Catholic churches; the town-hall, in classical style; the museum, containing a free library and municipal art-gallery; the grammar school, blue-coat school, clergy orphan daughters' school, St. Elphin's schools, a training college for school mistresses, a municipal school of art, technical schools, and other educational institutions; post-office; public baths; new police premises; the market-hall; municipal gas works, waterworks, tramways, electric light works, and works for the treatment of night-soil; an infectious diseases and a smallpox hospital, and an infirmary; a gymnasium; a public cemetery; public parks and gardens; and military barracks. Of the numerous industries of the town the most important are the manufacture of iron and iron goods, wire, leather, soap, and beer. Warrington is an ancient town, and had at one time a house of Augustinian friars. The famous academy, which existed here from 1757 till 1783, had among its teachers Dr. Joseph Priestley, Dr. William Enfield, Dr. Aikin, Dr. John Taylor, the Rev. Gilbert Wakefield, and other eminent men; it is now represented by Manchester College, Oxford. Pop. (1901) 64,241.

WARRINGTON, *wŏr'rĭng-ton*, LEWIS: naval officer: 1782, Nov. 3—1851, Oct. 12; b. Williamsburg, Va. Hav-

ing been educated at William and Mary College, he became midshipman 1800, and made his first cruise on the *Chesapeake* frigate in West India waters, suppressing piracy. He joined the schooner *Vixen* of Preble's squadron 1803, and served with great credit in the war with Tripoli. He became acting lieutenant 1805, and served on the station of Tripoli till 1807; was commissioned lieutenant 1807, master-commandant 1813; and while commanding the *Peacock* captured a British sloop. He was continually in sea-service till 1821, when he became commandant of the Norfolk navy-yard; he was commandant at Pensacola 1826. Warrington commanded the West India squadron 1824-26, and thereafter did service ashore in various capacities.

WARRIOR. See under WAR.

WARRNAMBOOL, Australia: a seaport town in Victoria, on Warrnambool or Lady Bay, 166 miles s.w. of Melbourne. The principal public buildings are the Episcopal, Roman Catholic, and other churches, various banking and insurance offices, mechanics' institute, the Odd Fellows' and the volunteer artillery halls, a hospital, and benevolent asylum. Pop. 6,500.

WAR'SAW: a province in Russian Poland; bounded n. by the Polish govts. Plock and Lomza, e. by Siedlce, s. by Radom, Piotrkow, and Kalisz; 5,623 sq.m. It is a narrow strip of land occupying part of the great central plain of Poland, and is generally low and flat, and not very fertile. It is traversed by the Vistula from s.e. to n.w., and portions of it are frequently devastated by inundations. The people chiefly are Poles, Mazurs, Jews, and Germans, there being but few Russians.—Pop. 2,000,000.

WAR'SAW: town of Russian Poland, former cap. of Poland, now cap. of govt. of Warsaw; on the left bank of the Vistula; about 395 m. e. of Berlin by railway, 700 m. s.w. of St. Petersburg; lat. 52° 13′ n., long. 21° 2′ e. It stands partly on a plain, partly on rising ground sloping upward from the river, extends over a wide area, and consists of the city proper and of a number of suburbs, several of which are beautifully built. A bridge of boats 1,626 ft. long, which formerly connected Warsaw with the suburb of Praga on the right bank of the Vistula, was superseded by an iron bridge 1876. The streets mostly are narrow, though several are broad and handsome. The Vistula at Warsaw is broad, shallow, and ever-changing in its sandy course; and is navigable for large vessels only after thaw has set in, when rivers of melted snow pour down into it from the Carpathians, or when it is swelled by the autumn rains. But the only craft seen are rude rafts, usually laden with wheat, which they convey to Danzig by river; though within the last few years steamers have occasionally been employed. Seen from Praga, on the right bank, the castle, on a

steep ascent, has a most imposing effect. Attached to the Saxon palace are a spacious court and gardens, considered the finest promenade in the city. Among the buildings are nearly 30 palaces; the Cathedral of St. John (dating from 1250), a Gothic building of great beauty, containing statuettes and many interesting monuments, among which is one by Thorwaldsen; the Lutheran church, loftiest building in Warsaw; and numerous other places of worship, including synagogues. There are several large and memorable squares, as the Sigismund Square, containing the monument erected by Ladislas IV. in honor of his father, Sigismund III. In this square, 1861, Apr. 8, 40 unarmed and unresisting Poles were massacred. The citadel, erected by Emperor Nicholas for the express purpose of intimidating, and, if necessary, destroying the city, commands from its situation, every part of Warsaw. The univ., broken up by Emperor Nicholas after the insurrection of 1830, was re-established by decree 1864, through the influence of the Grand Duke Constantine; and besides this institution there are several minor colleges, gymnasia, etc. Woolen and linen fabrics, chemicals, sugar, and leather are manufactured. Pop. about 750,000, about one-fourth of whom are Jews.

WARSAW, Ill.: town in Hancock co.; on the Mississippi river and on the Toledo, Peoria & Western railroad; 100 m. s.w. of Peoria. Fort Edwards was established within the limits of the town in the War of 1812. The largest river steamers can ascend the Mississippi to the town; and it is a shipping point for the agricultural produce of the region. It also has several manufacturing industries, including cooperage works, flour and woolen mills, pickle works, and manufactories of agricultural implements. It contains a public high school. Pop. 2,450.

WARSAW, Ind.: city, county-seat of Kosciusko co.; on the Tippecanoe river, and on the Pittsburg, Ft. W. & C., and the Cleveland, C. C. & St. L. railroads; 105 m. n. of Indianapolis. It was settled in 1836, and chosen as the county-seat in 1837; it was incorporated as a town in 1854, and as a city in 1867. It is in a lake region, and is popular as a summer resort. It is also an agricultural region, and Warsaw is the chief trade centre of the county. It has large canning and pickling works, flour mills, creameries, and manufactories of agricultural implements. A large park and the county court-house are among its notable features. There is also a public high school established in 1872, and a public library. Pop. (1900) 3,987; (1910) 4,430.

WARSAW, N. Y.: village, county-seat of Wyoming co.; in the valley of the Oatka creek, on the Erie, and the Buffalo, R. & P. railroads; 40 m. s.-s.e. of Buffalo. It was first settled in 1804, and was incorporated as a village in 1816. It is in an agricultural region; and

there are important salt deposits in the vicinity. The village contains salt works, broom factories, manufactories of knit goods, a foundry, carriage factories, lumber and saw mills. It has a public high school, established in 1897, with a large library of about 15,000 volumes. The water-works are owned and operated by the village. Pop. (1900) 3,048; (1910) 3,206.

WARSAW, *wawr'saw:* common name for the fish Black Grouper (*Epinephelus nigritus*) of the s. Atlantic coast and the Gulf of Mexico; called also Jew-fish; much esteemed as food, and weighing 3-15 lbs.; not abundant, and taken with hook from hiding-places in salt-water rivers, where it winters.—The same common names are given also to the catalogued *Promicrops guasa,* attaining 300 lbs. weight.

WARSCH, a. *wârsch.* See WERSH.

WART, n. *warwt* [Icel. *varta;* Dan. *vorte;* Ger. *warze,* a wart]: a dry excrescence of different forms, found on the skin of animals, as on the human hand; a hardened protuberance on the surface of trees. WART'ED, a. full of warts, having warts, in *bot.,* having little knobs on the surface. WART'Y, a. *-ĭ,* covered with warts; grown over with warts. WART'LESS, a. *-lĕs,* having no warts. WARTCRESS, a Brit. plant, the *Corōnŏpus Ruellii,* ord. *Cruciferæ.*

WARTBURG, WAR OF THE (*Kriec von Wartburg*): legendary poetic contest, represented to have taken place about 1206 or 1207, on the Wartburg (See EISENACH): also a strange, obscure, and unharmonious poem in two parts, composed in the Middle High German dialect about 1300, on the basis of a historico-mythical tradition of the contest between the assembled poets. In the first part, executed in a long and artistically managed measure, and entitled *Tone des Fürsten von Thuringia,* Heinrich von Ofterdingen challenges the other poets to a contest in verse—the fate of the vanquished to be death—and asserts the excellence of Leopold, Duke of Austria, over all the other princes. Victory, however, inclining to the Eisenachers, Heinrich calls in Klingsor, the Transylvanian magician and astrologer, to his aid, who, on his part, fights his verse-battle against Wolfram von Eschenbach, by the assistance of evil spirits, with riddles and dark science. With distinct reference to Klingsor's 'black art,' the simpler and shorter measure of this second part is called *Schwarze Ton.* Throughout the whole poem, which may be regarded as the first attempt at a secular drama, but which is rather an intermediate link between the Lyric contest and the Drama, one may trace an unmistakable imitation of Wolfram's style of poetry. The author is unknown. From the inequality of the style, it may be inferred that several hands were employed in its composition. The poem, which has been much overrated in modern times, seems to have had lit-

tle influence on literature. In a prose form the story of the Wartburg contest appears first—in the Thuringian Chronicles—after the beginning of the 14th century, and probably owes its origin to the poem. See MINNESINGERS. The poem was printed in a separate edition by Ettmüller (Ilmenau 1830), and is also in Bodmer's and Von der Hagen's collection of the *Minnesinger*.—See Von Plotz, *Ueber den Sängerkrieg auf Wartburg* (Weimar 1851).

WARTHÉ, or WARTE, *vâr'tā* (Polish *Warta, vâr'tâ*): longest and most extensively navigable affluent of the Oder; rising on the s.w. frontier of Poland, 35 m. n.w. of Cracow. In Poland it flows n. and w. for 300 m. It then flows w.n.w. through Prussia 180 m., passes Posen, and joins the Oder at Kustrin, where it is 620 ft. broad. Total length 483 m.; navigable 220 m.

WART'-HOG: a hog of the genus *Phacochœrus* and family *Suidæ*, closely resembling the true hog, particularly in the feet, but remarkably differing from it in dentition; the molar teeth being much like those of the elephant, replacing one another in the same manner. There are two triangular incisors in the upper jaw, and six small ones in the under; the tusks are lateral, very large, project far from the mouth, and are bent upward; there are six or eight molars in each jaw. The head is very large, and the muzzle very broad; the cheeks furnished with large wart-like excrescences, so that the appearance is altogether very remarkable and uncouth. It is native of Africa. Wart-hogs feed very much on the roots of plants, which they dig up by their enormous tusks. The AFRICAN WART-HOG, or HARUJA (*P. Æliani*), native of Abyssinia and of central Africa, from the coast of Guinea to that of Mozambique, is nearly 4 ft. long, has a naked slender tail of 12 in., is scantily covered with long bristles of light-brown color, and has a mane sometimes 10 in. long from between the ears along the neck and back. Another species is found in s. Africa (*P. Œthiopicus or Pallasii*), the *Valke Vark* of the Dutch colonists, at the Cape of Good Hope. The incisors of the latter fall out at an early age; those of the former are persistent.—A genus closely allied to *Phacochœrus* is *Potamochœrus*, of which there are several species, as the *Bosch Vark* of Cape Colony (*P. Africanus*), nearly black, with whitish cheeks having a central black spot; and the PAINTED PIG of w. Africa (*P. penicillatus*), reddish, with black face, forehead, and ears. The species of *Potamochœrus* frequent swampy grounds, and sometimes receive the name WATER-HOG. They have longer ears than the true wart-hogs, tapering and ending in a pencil of hairs; the face is elongated, and has a huge protuberance on each side. The flesh of all the wart-hogs and water-hogs is in high esteem. They are hunted by dogs, which are often killed in the encounter with

them. They are much addicted to fighting among themselves.

WARTON, *wawr'ton,* JOSEPH, D.D.: English poet and critic: 1722—1800, Feb. 23; b. Dunsfold, Surrey; son of Thomas Warton, vicar of Basingstoke, in Hampshire, professor of poetry at Oxford, from whom he received his earlier education. At the age of 14 he was sent to the great school at Winchester, whence, 1740, he was transferred to Oriel College, Oxford, where four years afterward he took his degree B.A. After several years as a curate, he was presented (1748) to the rectory of Winsdale, near Basingstoke. He had become known as a writer of verse in the *Gentleman's Magazine,* Dodsley's *Museum,* etc., and as author of a volume of *Odes and Other Poems.* In 1751 he went abroad with the Duke of Bolton; and after his return he issued, 1753, an edition of Virgil, with a translation of the *Eclogues* and *Georgics:* this, with its critical notes and dissertations, found great approval, and subsequently procured him the degree M.A. from Oxford. In 1756 appeared vol. I. of his chief literary performance, *Essay on the Writings and Genius of Pope;* vol. II. 1782. Venturing, as he did, to question the positive supremacy which it was then fashionable to attribute to Pope, Warton did not by this work attain any immediate increase of popularity; but the value in relation to the literature of the time of the critical principles announced in it, as also in his more casual essays, has since been recognized. In 1755 Warton was appointed second master of Winchester School, of which he became head 1766. He was made a prebendary of St. Paul's 1782, and the living of Thorley, in Hertfordshire, was conferred on him. He obtained besides (1788) a prebend in Winchester Cathedral, and the rectory of Easton, which he soon exchanged for that of Upham. He resigned the mastership of Winchester 1793, and applied himself to preparing an annotated edition of Pope (9 vols. 8vo 1797). At his death he was engaged on a similar edition of Dryden, of which he had published two volumes.—Though Warton's reputation has not survived as a poet, yet it certainly has as a critic, with that of his distinguished brother. See *Biographical Memoirs of Rev. Joseph Warton, D.D.,* by Rev. John Wooll, A.M. (1806).

WAR'TON, THOMAS: English poet and critic: 1728—1790, May 21; b. Basingstoke, in Hampshire, where his father, Thomas Warton, was vicar. Warton, like his elder brother Joseph, received his earlier education chiefly at home from his father. In 1743 he was entered at Trinity College, Oxford, where, 1750, he took his degree M.A. The next year he obtained a fellowship. He remained at the university, employed as a tutor. He was made professor of poetry 1757, and was esteemed as a lecturer. In 1767 he took his degree as bachelor of divinity, and was soon presented to the living of Kiddington by the

Earl of Lichfield. In 1782 that of Hill Farrance, in Somersetshire, fell to him by favor of his college. Very early he became known as a poet; and 1754 published *Observations on the Fairie Queene of Spenser,* which established his reputation as one of the first critics of the day (2d ed. 2 vols. 1762). Of Warton's miscellaneous literary activity, no account need be given in detail. The work by which chiefly he is remembered is his *History of English Poetry* (vol. I. 1774; II. 1778; III. 1781; unfinished at his death). In its wealth of curious and interesting lore regarding the earlier portion of English literature, the book remains unrivalled. Warton, 1777, published a collection of such of his scattered pieces as he deemed most worthy of being reprinted, and it found good acceptance. For the last six years of his life Warren was poet-laureate. His last work was an elaborately annotated edition of the Minor Poems of Milton (1785, carefully prepared reimpression 1791). In 1802 a new edition of his poems was published, with a Life of the author by Mant.

WARTS (L. VERRUCÆ): lengthened papillæ of the skin, closely adherent and ensheathen by a thick covering of hard dry cuticle. From friction and exposure to the air, their surface presents a horny texture, and is rounded off into a small button-like shape. Warts occur usually on the hands and fingers (rarely on the face or other parts of the body) of persons of all ages, but especially of children. Among varieties of warts are: (1) a long pendulous variety, *Verruca digitata,* sometimes occurring on the scalp of women, and causing great annoyance in brushing and combing the hair. (2) *Subungual Warts,* generally of syphilitic origin, growing, as their name implies, beneath or at the side of the finger or toe nails: they originate beneath the nail, and as they increase they crop out either at the free extremity or the side of the nail, and are often very painful. (3) *Venereal Warts,* so called, which occur upon surfaces exposed to moisture, commonly, therefore, on the genital organs; they are not necessarily of venereal origin. They are more fleshy and vascular than other warts. (4) *Senile Warts* are flat, more or less rough and scaly outgrowths from the horny layer of the epidermis, occurring in the aged, commonly on the skin of the face. They sometimes become cancerous in nature.

Very little is known of the causes of warts, except that persons engaged in dissection and *post-mortem* researches are especially liable to them; hence it may be inferred that they are due to some local irritation. In some cases, blood from a wart seems to be capable of producing similar warts when applied to the skin. In consequence of the capricious way in which warts often spontaneously disappear, there are numerous popular charms for their removal. Common warts are so apt to disappear that they may often be left to themselves.

Glacial acetic acid is perhaps the best remedy: it must be applied with a camel-hair pencil or glass rod till the wart is well sodden, care being taken not to blister the neighboring skin; one, or at most two, applications will be sufficient. Nitrate of silver and tincture of iron are popular and general applications. Small warts hanging by a neck may often be very simply removed by the moderately tight application of an elastic ligature to the base. The wart usually shrivels up, and falls off within a week. The other varieties of warts must be left to the surgeon.

WARWICK, N. Y.: village in Orange co.; on the Wawayanda creek, and on the Lehigh and Hudson River railroad; about 30 m. s.w. of Newburgh and 10 m. s. of Goshen. It is in an agricultural region, and near by are iron mines and granite quarries. In the vicinity are the beautiful lakes, Glennere, Greenwood, Clark's, and Wawayanda. The manufacturing establishments are railroad shops, a foundry, creameries, and fabric-hose works. It has six churches, Warwick Institute, graded schools, and a school library. There are two banks. The village is a favorite summer resort. Pop. (1900) 1,735; (1910) 2,318.

WARWICK, R. I.: town in Kent co.; on the Pawtuxet and the Providence rivers, the Cowsett and Narragansett bays, and on the New York, New Haven and Hartford railroad. It is 5 m. s. of Providence. It has extensive manufacturing interests; the chief industrial establishments are cotton mills, flour and grist mills, foundry and machine shops, and blacksmith and wheelwright shops. The government census of 1900 gives the number of manufactories 104, which were capitalized for $8,418,333, and which had 5,544 employees, who received annually $1,852,462. The raw material cost, each year, $2,522,789, and the products were valued at $6,197,506. The town includes several villages, in each one of which there are graded schools, and in some libraries. Warwick was settled in 1642 by a colony of 12 Englishmen, under the leadership of Samuel Gorton. The place was first called Shawomet; but in 1848 the name was changed by admirers of the Earl of Warwick. Massachusetts claimed control of the colony, and in 1643 one result of the contentions was that the place was nearly destroyed. Indians attacked the place several times, and, in 1676, burned a number of houses and wounded many of the defenders of the town. Nathaniel Greene (q.v.). was born in Warwick. Pop. (1900) 21,316; (1910) 26,629.

WARWICK, *wŏr'ĭk:* a municipal and parliamentary borough of England, chief town of the county of Warwick; on the Avon; 20 m. s.e. of Birmingham, 18 m. n.e. of Stratford-on-Avon, 108 m. n.w. of London. It is a very ancient town, and contains many interesting old buildings and institutions. Most notable is Warwick Castle, principal residence of the Earls of Warwick, beautifully

situated on a rocky elevation, 40 ft. high, on the banks of the Avon. Guy's Tower, a part of the castle, is 128 ft. high, and was built 1394; and Cæsar's Tower, still more ancient, is 147 ft. high. The interior, before the castle was partly burned, 1871, Dec. 3, was remarkable for splendor and elegance, and has been restored in similar style. The Earl of Leicester's Hospital for aged brethren has an annual income of more than £2,000. There are many other charities, with schools, libraries, etc. Agriculture and general trade employ a large number of persons. Pop. (1901) 12,000.

WARWICK, *wŏr'ĭk,* Sir GUY; or GUY OF WARWICK: legendary hero of one of the most ancient and popular English romances: said to have lived in the 10th century in Saxon times and in the reign of Athelstane; son of Segard, steward of Rohand, Earl of Warwick. He sought the hand of the earl's daughter Felice; and gaining her promise of it on condition of his earning it by knightly deeds, he crossed to Normandy, and at the great tournament of Rouen distanced all competitors, and at once set out into 'far lands,' travelling through Spain, Almayne, and Lombardy, and gaining the prize in every tournament. Returning, and finding Felice still unsatisfied, he traversed Flanders and Italy; then went to Constantinople to save Emperor Ernis from the Saracens, slew the mighty Coldran, cousin of the 'soudan,' and scattered his huge army. The grateful emperor pressed on him the hand of his lovely daughter Loret; but Sir Guy, tearing himself away, returned to his native country. A most portentious dragon was then ravaging Northumberland; and he hastened to meet the monster, slew him, and carried his head to King Athelstane, at Lincoln. The fair Felice had now no scruple to marry the hero. But regret for all the slaughter he had done merely for a woman's love overcame him, and after 40 days of wedded happiness he left his home in the garb of a palmer to visit the Holy Land, where he slew the ferocious giant Amiraunt; then returned to England; and finding Athelstane besieged in Winchester by the Danish Anlaf, of whose army the mainstay was the terrible Colbrand, Sir Guy, still in his disguise, after an awful struggle, struck off the champion's head. He now visited his wife—being unknown in his palmer's weeds—and then retired to a hermitage in Ardenne. Before his death he sent Felice her parting ring as a token; and she arrived in time to close his eyes, surviving him only 15 days, and was buried in the same grave.

WAR'WICK, RICHARD NEVIL, Earl of, K.G.: English feudal baron, popularly named the 'king-maker'; about 1420-1471, Apr. 14; eldest son of Richard, Earl of Salisbury, and Alice, daughter and heiress of Thomas Montacute. Lord R. Nevil, as he was then styled, early showed distinguished bravery and brilliant personal qualities in a hostile incursion across the Scottish marches, in which he

accompanied his father, the Earl of Salisbury. He became the most powerful nobleman in the kingdom, by his marriage with Anne, daughter and heiress of Richard de Beauchamp, Earl of Warwick. He not only acquired by this alliance the broad lands of the Warwick family, but was created Earl of Warwick, with succession to the heirs of his wife. He is the most prominent figure in the civil War of the Roses (q.v.), one of the darkest periods of English history. He was connected with both the Lancastrian and the Yorkist houses; and was first cousin of Edward IV. and second cousin of Henry VI. The Duke of York gained his support by his (the duke's) marriage with Lady Cecille Nevil, who was Warwick's aunt; and when the barons declared the incapacity of Henry VI., and chose the duke to be protector of the kingdom, Warwick led into the field his well-tried borderers of Wales. The Yorkists and the Lancastrians met first at St. Albans 1455, when Warwick, rushing suddenly into the town at the head of his men, won the battle by his impetuous onset. He was rewarded with the government of Calais—'then,' says Comines, 'considered as the most advantageous appointment at the disposal of any Christian prince, and that which placed the most considerable force at the disposal of the governor.' He also obtained command of the fleet for five years. In 1458 he sailed from Calais with five large and seven small vessels and attacked a fleet of 28 ships, belonging to the free town of Lübeck. After a battle of six hours, he took six of the enemy's vessels. In 1460 he landed in Kent at the head of his troops, and entered London amid the acclamations of the people. He defeated the queen's army, near Northampton, with great slaughter, and obtained possession of the person of the king. Richard, Duke of York (q.v.), now advanced his claim to the throne. Queen Margaret raised an army to rescue the king; and the duke, committing the idiotic monarch to the custody of the Duke of Norfolk and Warwick, advanced to Wakefield to attack the Lancastrians. The duke was taken and put to death; and Warwick's father, the Earl of Salisbury, with 12 other Yorkist chiefs, was beheaded at Pontefract. Another battle at St. Albans was won by the Lancastrians; but Edward, Earl of March, now Duke of York, accompanied by Warwick, marched boldly on London, which adhered to the Yorkist cause; and Edward was proclaimed king as Edward IV. The next battle was that of Towton, near York. The Lancastrians had retaken the pass of Ferrybridge, on the river Aire, and Warwick, in despair at the loss of so good a position, rode up to Edward, and dismounting, shot his own horse through the head, as a signal for an attack from which there could be no retreat, exclaiming: 'Sir! let him flee who will flee, but by this cross' (kissing the hilt of his sword) 'I will stand by him who will stand by me!' The Lancastrians were defeated with immense loss; and Edward, returning

to London in triumph, was crowned 1461, June 22. The battle of Hexham was followed by the capture of Henry; and Warwick, who had been left in command in London, placed the deposed king on a horse, under whose belly his feet were fastened, and thus led him through Cheapside to the Tower. Warwick, having been authorized to negotiate with Louis XI. of France for the marriage of his sister-in-law, the Princess Bonne of Savoy, to King Edward, could not brook the king's sudden marriage with Elizabeth Woodville, and seemed inclined to show that he could pull down as well as set up kings. He was now at the height of his power. To the earldoms of Warwick and Salisbury, with the estates of the Spencers, he added the offices of high admiral and great chamberlain, with the lord-lieutenancy of Ireland and the government of Calais. His power had grown too great for the safety of the throne. Comines states the income of his offices at 80,000 crowns a year, besides the immense revenues accruing from his patrimony. After being sent into honorable banishment by means of embassies to France, Burgundy, and Brittany, he gave his daughter in marriage to George, Duke of Clarence, against Edward's wish. He soon afterward broke out into revolt against Edward, and concluded a treaty with Queen Margaret, by which it was agreed that her son, Prince Edward, should espouse Anne Nevil, Warwick's daughter, and that, in failure of issue, the crown should devolve on Clarence. King Edward escaped to Holland; and Henry VI. resumed the sovereignty. This sudden turn of fortune soon met a check in another revolution. Edward raised a body of Flemings and Dutchmen, and, landing near Hull, advanced toward London. He gave battle to King Henry's army, commanded by Warwick, at Barnet, 1471, Apr. 14. The battle was memorable and important. Warwick and his brother, Montague, were left dead on the field, and with them fell the greatness of the House of Nevil. This fatal battle, followed by the decisive engagement of Tewkesbury, completed the defeat of the Lancastrians, and concluded the sanguinary War of the Roses. It appears (Fenn's *Letters*) that every individual (male?) of two generations of the great families of Warwick and Somerset fell either on the field or on the scaffold, a victim of these sanguinary contests. Warwick is the most conspicuous personage of these disturbed times. He kept open house wherever he resided, and daily fed 30,000 persons at his various mansions. He loved turbulence for its own sake, and was ready to make or unmake any king, according to the caprice of the moment.

WAR'WICK (Robert Rich), Earl of: English nobleman: 1590-1658; descendant of Lord Chancellor Rich. He sympathized with the Puritans of his time, and in the great rebellion served on the Puritan side as lieutenant of the fleet under Northumberland. He was deeply inter-

ested in the colonization of Rhode Island, and befriended the Rev. Thomas Hooker, founder of Wethersfield, Conn.

WARWICKITE, n. *wawr'wĭk-īt* [from *Warwick*, Orange co., N. Y., where found]: mineral occurring in slender rhombic prisms in granular limestone near Edenville, N. Y. Hardness, 3.4; sp. gr., 3.19 to 3.43; lustre, somewhat metallic to vitreous; color, dark-brown, with sometimes a copper-red tint; streak, bluish black; brittle; composition, a borotitanate of magnesia and iron.

WARWICKSHIRE, *wŏr'ĭk-shĕr:* a midland county of England; bounded w. by Worcestershire, n. by Stafford and Leicester shires, and s. mainly by Oxford; greatest length 50 m., greatest breadth 33 m.; about 885 sq.m. (566,458 acres). The surface is marked by gentle eminences and vales. The n. districts were formerly occupied by the forest of Arden, of which there are still remains; and the scenery, in general remarkably rich and charming, is varied by moor and heath. The principal rivers are the Avon, flowing from n.e. to s.w.; and the Tame in the n. The soil varies much in quality, being cold and heavy on the higher and more exposed positions; while in more favorable districts it is good. Of the whole area, there were (1881) 491,569 acres under all kinds of crops. The chief manufacturing centres are Birmingham and Coventry (q.v.): the brass jewelry, iron, and steel-pen trades are carried on in the former; ribbon-weaving and watch-making in the latter. Of minerals, coal, stone, lime, and marl are found. The county returns four members to the house of commons, besides the 4 from the boroughs of Birmingham, Aston Manor, Coventry, and Warwick and Leamington. Pop. (1901) 347,691.

WARY, a. *wā'rĭ* [Icel. *vara,* to warn: Ger. *gewahr,* aware: Sw. and Dan. *var;* Icel. *varr,* wary: F. *gare,* look out! take care! OE. *gaure,* to gaze: Fin. *wara,* foresight]: carefully watching and guarding against artifices and dangers; carefully cautious; discreet; prudent. WA'RILY, ad. *-lĭ,* with prudence; cautiously. WARIMENT, n. *wā'rĭ-mĕnt,* in *OE.,* a warding off; care; caution. WA'RINESS, n. *-nĕs,* the state or quality of being wary; cautiousness; prudent forethought.—SYN. of 'wary': cautious; circumspect; careful; prudent; discreet; watchful.

WAS, v. *wŏz* [Goth, *visan,* to remain, to be: Icel. *vera;* Sw. *vara;* AS. *wesan,* to remain, to be: Skr. *vas,* to dwell, to live]: the past tense of the verb *be.*

WASCO INDIANS ('grass,' or 'grass people'): a tribe of the Chinookan stock of North American Indians, also known as Dalles Indians and as Wascopums. They formerly claimed the country about The Dalles, on the s. bank of Columbia river, in Wasco co., Oregon, therefore forming, with the Wushgum or Tlagluit, the easternmost extension of the Chinookan stock. They were partici-

pants in the Wasco treaty of 1855 and are now on Warm-spring reservation, Oregon. Pop. about 290.

WASECA, Minn.: city, county-seat of Waseca co.; on Clear Lake, and on the Minneapolis and St. Louis and the Chicago and Northwestern railroads; about 60 m. s. by w. of Minneapolis and 25 m. s. by e. of Mankato. It is in an agricultural and stock-raising region. It has flour mills, creameries, and machine shops. The Minnesota Chautauqua holds its sessions on their grounds bordering on the lake, and adjoining the city. There are 12 churches, the Holy Child Jesus Academy, graded public schoôls, and a school library. Pop. (1900) 3,103.

WASH, v. *wŏsh* [imitative of the sound of dashing water: AS. *wascan;* Ger. *waschen;* Sw. *waska,* to wash; Norw. *vassa,* to dabble, to splash: Gael. *uisge,* water: to cleanse with water; to perform the business of cleansing clothes; to overflow or dash against; to sweep off, as from the deck of a vessel; to perform the act of ablution; to free from ceremonial defilement; to wet, as by falling rain; to coat or ornament by overlaying with a substance in a moist state; to cover with a thin coating or deposit of metal; to purify; to resist injury from washing, as colors that will *wash;* hence, in *slang,* to endure trial or examination, as, the story won't *wash:* N. a substance in a moist state laid or spread over a surface to beautify or preserve it; a cosmetic; a lotion; a color laid over a pencil or crayon drawing to give it a more finished and natural appearance; the sweep or rush of water: any waste liquid, as that of a kitchen, used in feeding hogs; fermented wort; the shallow part of an arm of a sea, or of a river; a marsh; a bog; a quagmire; the whole quantity of clothes washed at once; the act of washing them; a liquid weak and poor; matter collected by water. WASH'ING, imp.: N. the act of cleansing with water; ablution; the clothes washed at one time. WASHED, pp. *wŏsht.* WASH'ER, n. *ėr,* one who or that which washes; a flat metal ring placed between the nave of a wheel and the linch-pin; a circular piece of leather, rubber, metal, or other material, placed at the base of a screw or nut to prevent injury to the surface, or to render the junction tight. WASH'ABLE, a. *-ă-bl,* that can stand washing. WASH'Y, a. *-ĭ,* damp; soft; weak; thin; watery; poor or valueless. WASH'INESS, n. *-nĕs,* the state or quality of being washy, watery, or weak. WASH-BALL, a composition of soap and other substances for washing. WASHBOARD, a board on the gunnel of a boat to prevent the sea breaking over; a corrugated board on which clothes are rubbed when washed by hand. WASH-HOUSE, an out-building for washing clothes. WASH-LEATHER, a soft kind of leather, usually of split sheepskin, dressed to imitate chamois leather. WASH-POT, a vessel in which anything is washed. WASH-TUB, a tub for washing clothes. WASHSTAND, or WASHHAND-STAND, a small table with a basin and conveniences for washing the hands and face. WASHERMAN,

a man who washes. WASHERWOMAN, a woman who washes clothes.

WASH, England: a wide estuary on the e. coast, between the counties of Lincoln and Norfolk, 22 m. in length and 15 m. in average breadth. It is surrounded by low and marshy shores, and receives the Witham, Welland, Ouse, Nen and Nar rivers. The estuary for the most part is occupied by sandbanks, dry at low water, and intersected by channels through which the rivers flow into the North Sea. On both sides of the channel by which the Ouse falls into the sea considerable tracts of land have been reclaimed. Anchorage is afforded to vessels by two wide spaces or pools of water, called respectively Lynn Deeps, opposite the Norfolk, and Boston Deeps, off the Lincoln coast.

WASH BOTTLE: in analytical chemistry, an apparatus used for delivering a fine jet or stream of liquid on to a precipitate for the purpose of washing it, or for removing any residue of a solution or solid particles from one vessel to another. It consists of a flask of hard glass, fitted with a cork or India-rubber stopper perforated in two places. Through each perforation is passed a piece of bent glass tubing, one being carried to within half an inch of the bottom of the flask, and the portion of tubing outside drawn to a fine open point. The other tube is carried just within the bottle, and it is to the outer end of this that the lips are applied in blowing into the apparatus in order to expel the liquid contained in it.

WASHBURN, Maine: town in Aroostook co.; on the Aroostook river; 50 m. n. by w. of Houlton. It is a distributing centre of considerable importance, although it is 8 m. from a railroad station. It is a favorite summer resort. It has three churches, a high school, graded school, and public library. Pop. (1910) 1,582.

WASHBURN, Wis.: city, county-seat of Bayfield co.; on Lake Superior, and on the Northern Pacific, and the Chicago, St. Paul, Minneapolis and Omaha railroads; about 50 m. e. of Superior, and 200 m. n.e. of Minneapolis, Minn. In 1665 a Jesuit mission was established in the place now occupied by the city. Washburn's first permanent settlement was made in 1883, and in 1884 it was incorporated. In the vicinity are brownstone quarries, and in the forests there is considerable lumbering. There are nearly 2,000 employees in the industrial establishments. Washburn ships large quantities of stone, lumber, and grain; and distributes to the lumber camps and the towns and hamlets of the vicinity general merchandise. There are several church buildings, the county court-house, which cost $50,000, and several good business blocks. The educational institutions are the Walker High School, founded in 1889 (building cost $40,000), three graded schools, one large Roman Catholic parish school, and a school library. The two banks have a com-

bined capital of $50,000. The majority of the inhabitants are Scandinavians. **Pop.** 7,000.

WASHBURN COLLEGE: located at Topeka, Kan. It was founded in 1865 by the General Association of the Congregationalists of Kansas, but is non-sectarian in policy and government. It was first called Lincoln College, and the name changed in honor of Ichabod Washburn, of Worcester, Mass., who gave the college $25,000. The college is co-educational. The course of study was at first not above the academic grade, but was soon expanded to a full college course, and other departments added until the college now includes five departments: (1) the college; (2) the School of Medicine, founded as the Kansas Medical College in 1890 and made a department of Washburn in 1902; (3) the School of Law, opened in 1903; (4) the School of Fine Arts; (5) the Washburn Academy. The college confers the degrees of B.A and B.S. for the completion of a four years' course, and the degrees of M.A. and M.S. for graduate work. The students maintain four literary societies, two for men and two for women, an oratorical association, Christian associations, and an athletic association. In addition to the intercollegiate sports in which the college participates, an annual college field-day has been inaugurated. The college occupies a campus of 160 acres just outside the city on elevated ground; the buildings include Rice Hall (originally Science Hall, the name being changed in 1902), Whitin Hall, the observatory building (erected in 1903 for the departments of physics and astronomy), the MacVicar chapel, the Boswell Memorial Library, Hartford Cottage and Holbrook Hall (women's dormitories). In 1904 a new library building, the gift of Andrew Carnegie, was in process of construction. The library in 1904 contained 12,000 volumes; in addition the schools of law and medicine have separate libraries; and the Topeka Public, the Kansas State, the Kansas State Historical Society, and the Academy of Science libraries are open to students. The students numbered over 600.

WASHBURN, *wŏsh'bėrn*, CADWALLADER COLDEN: lawyer: 1818, Apr. 22—1882, May 14; b. Livermore, Me. Having worked on his father's farm and been employed in a country retail store, attending school in winter, he was schoolmaster for one term, then emigrated to the west, studied law, and began practice in Mineral Point, Wis., 1842; but 2 years later became agent for settlers desiring to enter on the public lands. In partnership with Cyrus Woodman, he established a bank in Mineral Point 1852. Washburn was representative in congress 1855, Dec.—1861, Mar., and then refused renomination. He became colonel of a Wisconsin cavalry regiment 1861, Oct. His first military service was in Arkansas, under Gen. Samuel R. Curtis. In the battle of Grand Croteau he saved the 4th division of Curtis's army from annihilation by the enemy. He became brigadier-general 1862,

July, and major-general Nov.; participated in the siege of Vicksburg; then was put in command of the 13th army corps and transferred to the Gulf department. Landing at the entrance of Matagorda Bay, Tex., with 2,800 men, 1863, Nov. 29, he reduced Fort Esperanza, a work made bomb-proof with railroad iron, surrounded by a deep moat filled with water, having a garrison of 1,000 men, and mounting 10 guns. He was appointed commandant at Memphis 1864, Apr. He was again representative in congress 1865, May—1871, Mar.; governor of Wisconsin 1872-74. He then retired from political life and gave attention to the development of his property. As owner of great tracts of timber-lands he became a great manufacturer of lumber. At Minneapolis he established the first flouring-mill for applying the 'patent process.' He founded at the cost of $50,000 an astronomical observatory at the state university of Wisconsin. He bequeathed to the city of La Crosse $50,000 for a public library, and to Minneapolis $375,000 for an orphans' home.

WASH'BURN, Charles Ames: editor: b. Livermore, Me., 1822, Mar. 16; d. 1889, Jan. 26. He graduated at Bowdoin 1848, and soon afterward practiced law in Mineral Point, Wis. He removed to California 1850, where he was employed as journalist, and 1853 founded the *Alta California* newspaper in San Francisco; 1858-60 he was editor and part owner of the San Francisco *Daily Times;* was presidential elector-at-large 1861, United States commissioner to Paraguay 1861-63, then minister resident 1863-68. During his term of residence there, Paraguay was ruled by Francisco Lopez, and Washburn, having been accused of conspiring against the life of the dictator, was compelled to flee the country. After his return to the United States Washburn became a resident of New Jersey, and applied himself to mechanical invention and literature. He is inventor of a form of typewriting machine, the 'typograph.' He published two novels—*Philip Thaxter* (1861) and *Gomery of Montgomery* (1865); a *History of Paraguay* (1870); *Political Evolution* (1887); *From Poverty to Competence* (1887).

WASH'BURN, Edward Abiel, D.D.: clergyman: 1819, Apr. 16—1881, Feb. 2; b. Boston, Mass. Having graduated at Harvard 1838, he studied theology at Andover Seminary and in New Haven; and 1842 was licensed as a Congregational preacher. He entered the ministry of the Protestant Episcopal Church 1844, July 12, when he was ordained deacon; he received priest's orders 1845. He was rector of a church in Newburyport, Mass., 1844-51; travelled in Egypt and the East 1851-53; was rector of a church in Hartford, Conn., 1853-62, in the meantime lecturing on church polity in Berkeley Divinity School, Middletown, Conn.; rector of a church in Philadelphia 1862-65, and of Calvary Church in New York 1866-81.

Dr. Washburn was a member of the American New Testament Revision Co. He was a leader among low-churchmen, and held distinguished rank for catholicity of spirit, Christian fervor, and intellectural force. He published *Relation of the Episcopal Church to the Other Christian Bodies* (1874); *Social Law of God* (sermons); *Voices from a Busy Life* (poems).

WASH'BURN, EMORY, LL.D.: lawyer: 1800, Feb. 14—1877, Mar. 18; b. Leicester, Mass.; descendant of John Washburn, first secretary of the Massachusetts Bay Co., and so a kinsman of most of the other Washburns of the United States. He graduated at Williams College 1817; was admitted to the bar 1821; settled in Worcester 1828, and there for 30 years stood at the head of the legal profession. He was a member of the Massachusetts house of representatives 1826-7, and of the Massachusetts senate 1841-2; judge of the common pleas court 1844-48. He was elected governor 1853, re-elected 1854; became Bussey professor of law in Harvard 1856; resigning the professorship 1876, he resumed practice in Cambridge, and represented that town in the state legislature. He published numerous genealogical and historical memoirs and works on the law; among them, *Judicial History of Massachusetts*, 1630-75 (1840); *History of Leicester* (1860); *American Law of Easements and Servitudes* (1863); *Testimony of Experts* (1866); *Study and Practice of Law* (1871).

WASH'BURN, GEORGE, D.D.: missionary and educator: b. Middleboro, Mass., 1833, Mar. 1. After graduation at Amherst College 1855, he studied theology at Andover Seminary, and 1858 went to Turkey as missionary of the American Board of Foreign Missions: he was released from service to the board 1868; but still continued his missionary labors. He was professor of philosophy and political economy in Robert College, Constantinople, 1869-76, and then became president of that college. After the war between Russia and Turkey, the first parliament of Bulgaria passed a vote of thanks to Washburn for his efforts in behalf of Bulgarian freedom; and 1884 the government of Bulgaria conferred on him the cross of commander of the order of St. Alexander. Dr. Washburn is known as a clear, instructive, and vigorous writer. He has contributed articles to several English and American periodicals, and has published *Woman's Work in the Church*.

WASH'BURN, ISRAEL, LL.D.: governor of Me.: 1813, June 6—1883, May 12; b. Livermore, Me.; grandson of Israel Washburn, revolutionary soldier, descendant of John Washburn, secretary of Plymouth colony, who came from England to Duxbury, Mass., 1631. He was admitted to the practice of law 1834, and settled in Orono, Me.; was member of the Maine legislature 1842-3; represen-

tative in congress 1851, Dec.—1861, Jan.; then was governor of Maine for one term; collector of customs at Portland 1863-77. Washburn was elected president of Tufts College 1875, but declined the office. He published (1874) *Notes Historical, Descriptive, and Personal, of Livermore.*—His father, ISRAEL WASHBURN, settled in Maine 1806, and engaged in ship-building on the Kennebec 1808; he established a trading-post at Livermore, Me., 1809.—The father of this Israel Washburn, whose name also was ISRAEL WASHBURN, served in the revolutionary war and reached the rank of captain. He was a citizen of Massachusetts, was repeatedly elected to the Massachusetts legislature, and was member of the Massachusetts convention that ratified the United States Constitution.

WASHBURN, SAMUEL BENJAMIN: American naval officer, son of Israel Washburn (1784-1876) (q.v.): b. Livermore, Me., 1824, Jan. 1. He became a shipmaster in the merchant marine, and later engaged in the lumber trade in Wisconsin. During the civil war he entered the United States naval service as a volunteer, and at the battle of Fort Darling won special commendation for skill and gallantry. Later he commanded a squadron of United States warships and performed many valuable services for the government.

WASH'BURN, WILLIAM BARRETT, LL.D.: United States senator: 1820, Jan. 31—1887, Oct. 5; b. Winchendon, Mass. After graduation at Yale, 1844, he engaged in manufacturing in Greenfield, Mass., and there also was president of a bank. He represented the town in both branches of the legislature 1850-54; was representative in congress 1862-72; was governor of Massachusetts 1872-3-4; but 1874, Mar. 3, resigned the governorship to take a seat in the United States senate vacated by the death of Charles Sumner. He retired from public life 1875. He bequeathed to the Home Missionary Society, the American Missionary Association, and the American Board of Commissioners for Foreign Missions, about $50,000 each. His benefactions to the public library of Greenfield were large.

WASHBURN, WILLIAM DREW, LL.D.: American legislator and manufacturer, son of Israel Washburn (q.v.); b. Livermore, Me., 1831, July 14. He was graduated at Bowdoin in 1854, admitted to the bar in 1857, and in that year engaged in law practice in Minnesota. He was a member of the Minnesota legislature in 1859 and in 1871; was surveyor-general in 1861-5; served in congress in 1879-85; and in 1889-95 was a United States senator. He engaged extensively in the lumber and flour industries, was one of the builders of the Minneapolis and St. Louis railroad, of which he was president until 1889, and he is president of the Bismarck, Washburn and Great Falls Railroad Co.

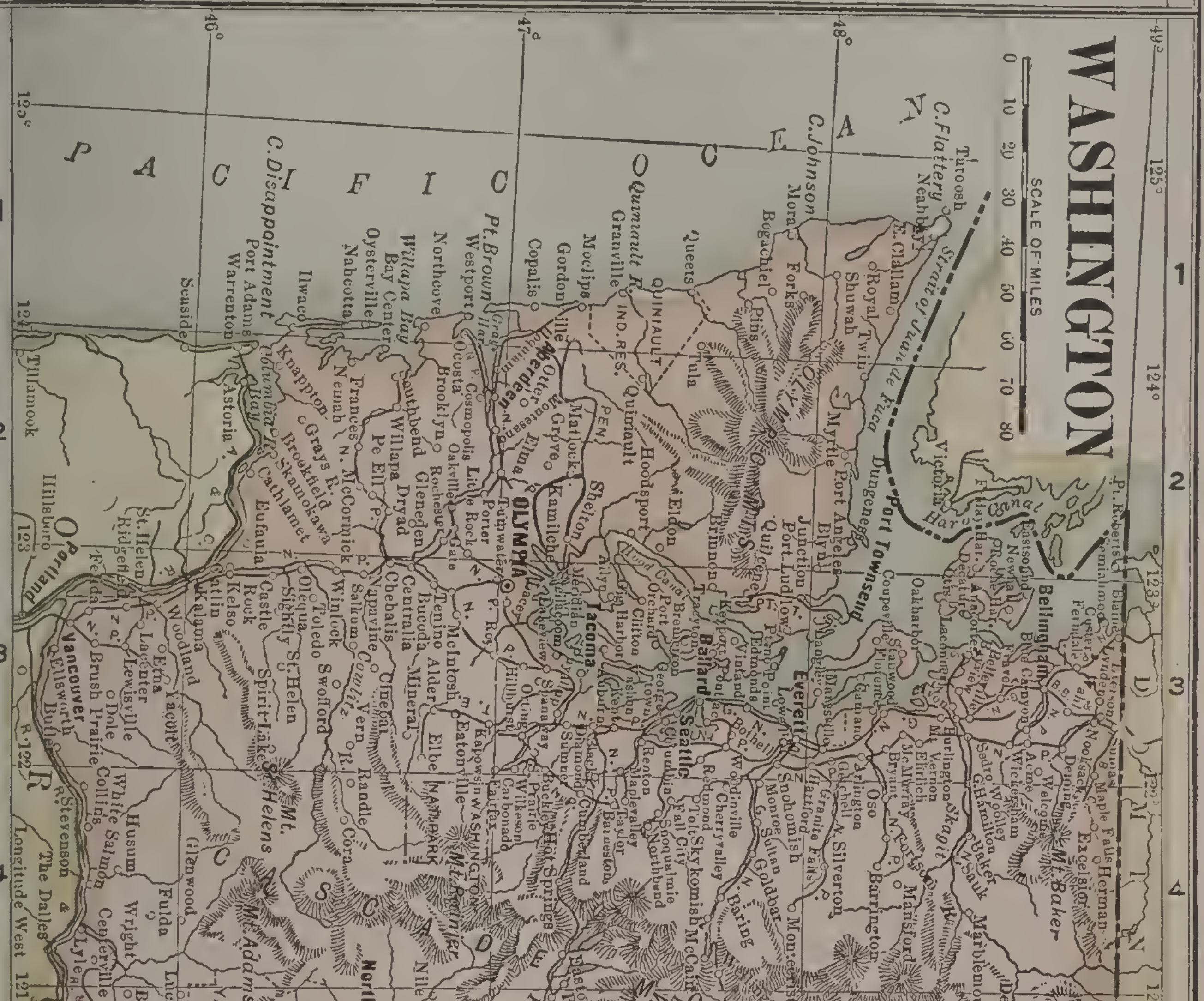
WASH'BURNE, Elihu Benjamin: statesman: 1816, Sep. 23—1887, Oct. 22; b. Livermore, Me.; bro. of Israel W. (1813–83) (q.v.); though he chose to spell his surname differently. He was a printer's apprentice 1833; then a school-teacher; was employed in the office of the *Kennebec Journal* in Augusta, Me., 1835; studied at Kent's Hill Seminary 1836; then studied law in Harvard Law School, and was admitted to the bar 1840. He began the practice of law in Galena, Ill., at the same time entering political life as a whig; soon he rose to distinction both as lawyer and as politician. He was representative in congress 1853, Dec. —1869, Mar., and was chairman of the house committee on commerce for 10 years. He earned the name 'watch-dog of the treasury' by his close scrutiny of all demands on the treasury. He was steadily opposed to the policy of granting to railroad corporations subsidies of public lands; and denounced as 'the greatest legislative crime in history' the law of congress that made the govt. mortgage on the Pacific railroad subordinate to the railroad companies' mortgage. He was appointed by Pres. Grant U. S. sec. of state in Grant's first term, but resigned to take the post of minister to France. He was minister during the war with Prussia; and before, during, and after the siege of Paris, as well as during the troubles of the Commune, was greatly influential in saving Americans and other foreigners from molestation. The German govt. made use of his good offices in various ways. W. had the respect and confidence of both the belligerent governments; and in a position of complex difficulties acquitted himself with a remarkable combination of delicate tact and forcible activity. After his return from France he resided in Chicago (where he died); and wrote a series of magazine articles, afterward published in a vol., *Recollections of a Minister to France* (1887, 2 vols.). W. edited a *History of the English Settlement of Edwards Co.* (Ill.), and *The Edwards Papers*.

WASH'ING: act or operation of cleansing with water, with or without rubbing. The first essential is suitable water—in other words, *soft* water: see Water-supply Yellow Soap (q.v.), the kind chiefly used in washing linen, should not be very pale in color, or very low in price, because the soap-maker, in order to gratify the desire for a light color, is obliged to reduce the strength of good dark soaps with adulterants. Soap, as is well known, improves by keeping. Soft or potash soap is sometimes used to wash coarse things, on account of its being stronger than hard soap; but its smell is objectionable. Soda is easily procured good; and as the merit of washing-powders depends on the amount of alkali which they contain, to buy them is only a dear way of buying soda.

In arranging clothes for washing, it is desirable to sort them into kinds most suitable for washing together—such as lace, nets, and fine muslin into one heap; white body-linen into another; colored things of the nature of prints and ginghams into another; and so on. It is desirable also to wash clothes as soon as possible after they are soiled.

Area in Square Miles, 69,810. Population, 518,103.

Number of Counties, 37. Capital of State, Olympia.



WASHING.

Previous to washing, all white articles should be soaked for a night in cold water in which a little soda has been dissolved, as the steeping in alkaline water greatly aids in removing all dirt of a greasy nature. The clothes should then be washed twice in clean tepid water with sufficient supply of soap. If the water is quite cold, the dirt is taken off with difficulty; and if too hot, it is apt to fix the dirt into the fibre of the cloth. The clothes should next be examined for spots or stains, so as to remove them, if possible, by additional rubbing; after which they are boiled for at least 15 minutes in soap and water. Ink-stains or iron-molds require to be taken out with oxalic acid or the essential salts of lemon (oxalate of potash); and fruit-stains by boiling the stained parts with pearl-ash. After being boiled, the clothes are rinsed twice in cold water; and in the second rinsing a little stone-blue is added, to neutralize any yellowness occasioned by the washing. When this is done, they are wrung, and hung out to dry.

For the washing of flannels, it is even more desirable that the water should be soft than for linen or cotton; and it should contain no soda or potash in any form, as though a little alkali would more effectually remove dirt, yet it always turns woolens yellow, and at the same time thickens them. Rubbing, wringing, or squeezing is to be avoided, as tending to make woolen goods shrink, by facilitating their tendency to felt or mat into a thicker fabric. As to ladies' colored dresses of fine wool, such as merino, it is considered best to wash them in warm soft water with ox-gall, say a pint in a tubful of water. Ox-gall is a soap in its chemical nature, and it clears and brightens the colors.

The washing of printed cotton fabrics, especially muslins, is more difficult than formerly, on account of the fugitive nature of some of the dye-stuffs employed. The beautiful hues produced by the aniline or coal-tar colors, and by the archil lakes in imitation of them, have led to their extensive use in calico-printing, as well as in the dyeing of silk and wool. These dyes can scarcely be said to be permanent on any fabric; but on cotton they require to be fixed by mordants, such as albumen (white of egg), which will scarcely stand washing at all, and to which hot water is utter destruction. The same is true of some other dyes, such as the light blue produced by artificial ultramarine. If economy is to be studied, it is far better to have printed dresses done in fast colors—the reds and purples, from madder, e.g.—as they, though less attractive at first, can be washed without injuring their appearance. All such articles should be washed in soft warm water; that which has been used for flannels, if not too dirty, will do. When thoroughly cleaned, they are to be well rinsed in clean cold water, and not allowed to remain long in contact before they are hung up to dry.

White-silk articles, e.g., stockings and gloves, should be washed with soap, first in milk-warm, afterward in nearly boiling water. They will be improved if hung up for a short time in the fumes of burning sulphur (sulphurous acid) while still damp.

WASHINGTON.

WASHINGTON, *wŏsh'ĭng-ton:* state; one of the United States of America: 42d in order of admission into the Union, 29th admitted under the federal constitution; known as the Terr. of Washington 1853–1889, Nov. 11; popular name 'The Corner State.'

Location and Area.—W. is in lat. 45° 32′—49° n., long. 117°—124° 28′ w.; bounded n. and n.w. by Brit. Columbia, e. by Ida., s. by Or., w. by the Pacific Ocean; extreme length e. to w. 360 m., extreme breadth n. to s. 400 m.; land surface 66,880 sq. m., water surface 2,300 sq. m., total 69,180 sq. m. (44,275,200 acres); timber-lands 20,000,000 acres, prairies and plains 10,000,000, alluvial bottom-lands 5,000,000; ocean coast-line about 180 m.; greatest elevation Mt. Rainier (3d highest mountain in the United states), 14,444 ft.; cap. Olympia.

Topography.—The Cascade Mountains divide the state into two nearly equal parts, known locally as E. W. and W.W. Between them and the ocean is the Coast Range, 3,000—5,000 ft. high. From the Coast to the Cascade Mountains a fine level tract of country extends e. 40–60 m., terminating in the water-shed of the Cascades, which are 5,000—8,000 ft. high. Thence high rolling prairies extend e. more than 200 m. to the base of the Blue Mountains. West W. is densely covered with timber, with small areas of open land, and East W. is a vast wheat-growing and stock-raising country. Owing to nature's prodigality in water-courses, no part of the state is remote from water transportation. Puget Sound is a vast inland sea (2,000 sq. m.), and besides there are the Strait of Juan de Fuca, Admiralty Inlet, Hood's canal, and other bays, harbors, and inlets, giving the state a shore-line of nearly 1,600 m. The most prominent bays and inlets, affording commodious and secure harbors, 2–8 m. long, 1–6 m. wide, with broad entrances, are Neah Bay, Port Discovery, Port Townsend, Port Ludlow, Port Madison, Port Gamble, Port Orchard, Port Blakely, Elliot Bay, Commencement Bay, Steilacoom, Budd's Inlet, Tunalip, Penn's Cove, Utsalady, and Bellingham. Next to San Francisco and Puget Sound, Gray's Harbor and Shoalwater Bay are the two largest harbors on the Pacific coast.—W. has 50 rivers of more or less commercial importance. The Columbia, which forms almost the entire boundary between W. and Or., traverses the state e. to w., and with its tributaries drains almost the whole state. Only 450 m. separate the navigable parts of the Columbia and the Missouri rivers, and the Snake Fork of the Columbia is navigable to within 150 m. of Great Salt Lake. Among the rivers that empty into Puget Sound are the Nesqually, Puyallup, Duwamish, White, Summanish, Snohomish, Snoqualmie, Stelaguamish, Skagit, Samish, and Nooksack—all navigable by steamboats; and Des Chutes, Cedar, and Skykonish—all non-navigable. Other important rivers are the Cowlitz, Lewis, Cathlapootle, Washougal, Takani, Spokane, and Okanogan.

Climate.—In East W. the summer heat is intense in the daytime; nights are invariably cool; winters short and severe; snow seldom falls before Christmas; spring begins

in Feb., summer about May 15; average temperature 52°; mercury ranges 55°—70°. In West W. the mean temperature is 63° in summer and 30° in winter. Roses bloom in Seattle in Dec., pansies in Walla Walla in Jan., peaches blossom in Olympia in Feb., and snow banks are frequently within sight of each place in Aug. West W. has two seasons, the dry and the rainy, the latter from late in Oct. till mid. Apr. For the climate generally it is claimed that that of East W. is similar to that of France, and that of West W. like "one produced by adding the mildness of Va. to the moisture of England."

Geology.—The greatest natural wealth of the state is in its forests, and the largest article of export is the Oregon pine, more properly the yellow and red fir. This tree is sometimes 12 ft. in diameter and 300 ft. high, but the average saw logs are 20–60 in. in diameter. The timber-trees, in the order of importance, are the yellow and red fir; white and red cedar; spruce; larch; white pine; white fir; hemlock; bull pine; tamarack; alder and maple; ash and oak; cherry and laurel; and the cottonwoods. The pine attains a height of 160 ft., silver fir 150, black spruce 150, and white cedar 100. W. timber is exported to all parts of the world, and is valuable particularly in shipbuilding. The other economic properties are coal, chiefly bituminous; bog, magnetic, and brown hematite iron ore; gold; silver; copper; lead; cinnabar; limestone; sandstone; granite; marble; gypsum; kaolin; slate; and petroleum. The Cambrian and Silurian, eozoic, cretaceous, and tertiary formations predominate in West W.; the eozoic and tertiary in the n.e.; the volcanic in the central and s.c. portions; and the carboniferous in various parts of West W., especially in the vicinity of Bellingham Bay and Lake Washington.

Zoology.—The quadrupeds, birds, and fish are about the same as those in Oregon (q.v.); the Columbia river salmon is the same; and oysters are very abundant and of excellent quality, particularly in Shoalwater Bay.

Agriculture.—There are about 40,000 farms, comprising about 15,000,000 acres, of which about two-fifths is improved land. Irrigation has of later years done much toward advancing the agricultural status of W. The principal crops are wheat, oats, barley, potatoes, hay, rye, and corn. Dairy products and live stock are both very profitable, while orchard products are cultivated to a large extent, the apple crop being particularly notable. Alfalfa and other forage crops are very valuable, while the irrigated lands produce unrivalled crops wherever they exist.

Manufactures.—There are over 3,000 manufacturing establishments, producing goods of an annual value of about $150,000,000. The principal industries are lumber; flour and grist mill products; slaughtering and meat packing; lumber and planing mill products; print-

ing and publishing; liquors; foundry and machine shop products; and canning and preserving fish. Shipbuilding is also carried on extensively.

Lumbering.—This is by far the greatest industry of the State. W. is very rich in timber, about 45,000 sq. m. being well wooded. The yellow fir tree is the most valuable, comprising nearly one-half the merchantable timber. The valuable varieties found in abundance are the red cedar, western hemlock, yellow and sugar pines, spruce and westernlarch. There are about 1,500 lumber and planing mills and shingle and planing mills, the total annual consumption of lumber being about 2,000,000,000 feet.

Mines and Quarries.—The earliest discovery and working of coal were near Bellingnam Bay in the northern part of the State. These mines were profitable for many years, but the greatest deposits are now in Puget Sound basin and on the eastern slopes of the Cascade Mountains in Kittitas County. King and Pierce counties also have immense deposits and all the coal fields are practically inexhaustible. The qualities range from a rich bituminous coking coal to brown liquites, adapted for coking, gas, steam and domestic purposes, and anthracite has also been discovered near Mount Rainier. Recent figures show a production of nearly 3,000,000 tons, valued at $5,500,000. There are large deposits of iron ore in the Cascade range and in the Puget Sound basin: copper and lead are found in the Cascade range and the Okanogan Highlands; bog ore is found in several localities; magnetic ore in King County; and brown hematite is worked to some extent along the Skagit River. The precious metals are found in several localities and the working of the mines has proved them to be of considerable value, especially in the northeastern part of the State where the mines have been worked on quite an extensive scale. Gold has been discovered in many places in the Cascade range and in the Okanogan Highlands. There are also numerous mines and quarries of limestone, sandstone, silver, lead, nickel, marble, granite and slate.

Fisheries.—Salmon fishing is the most important of the fisheries, and the cod, halibut, mackerel and herring fisheries on the banks of the coast of W. and Alaska employ a large number of men. Halibut in large quantities is shipped to eastern cities in refrigerator cars. Oyster culture is carried on to a considerable extent in Puget Sound and Willapa Harbor. Clams, crabs and shrimp are abundant, and game fish abound in the fresh water streams and lakes. In 1895 the State undertook the work of propagating the salmon and it has been carried on with much success, the hatcheries established having a capacity of from 4,000,000 to 8,000,000 fish each per season.

Commerce and Transportation.—The transportation facilities of W. are excellent, both by water and railroad. Puget Sound, the Strait of Juan de Fuca, the Pacific Ocean, and the numerous lakes and rivers render all the w. and many of the e. parts accessible to boats. A large fleet of steamers for local traffic plies the waters of Puget Sound, while many steamboat lines carry on trade between Seattle, Puget Sound and Alaska, British Columbia, California, and the Orient and between Gary's Harbor and San Francisco. There is also a large fleet of sailing vessels and itinerant steamers. The total value of imports is over $15,000,000 and of exports over $50,000,000 a year. A very valuable trade is carried on between W. and the other Pacific Coast States, Alaska, Hawaii, and the Philippine Islands, the annual receipts averaging over $30,000,000.

W. is very well provided with railroad facilities. Altogether there is a total trackage of more than 3,800 miles of steam railroad, divided among many prominent roads, including the Northern Pacific, Canadian Pacific, Burlington system, etc. The last two named reach Puget Sound under traffic arrangements with other roads. The state's excellent facilities become all the more apparent when it is realized that only as recently as 1880 there were but 289 miles of track throughout the state. Besides the mileage of steam railroad tracks, W. boasts about 15 lines of street and elevated railways, operating 500 miles of track.

Finance and Banking.—The total assessed valuation of property including both personal and realty, but exclusive of all railroad, telephone, and telegraph property is $789,912,979; the tax rate is $31 per $1,000; and the state's bonded debt is $1,006,024. There are nearly 50 national banks, nearly 100 state banks, and over 50 private banks throughout the state.

Religion.—The leading denominations in W. in point of numbers are the Methodist Episcopal, Baptist, Presbyterian, Protestant Episcopal, Roman Catholic, Disciples of Christ, and Congregational.

Education.—The state spends annually over $5,500,000 in the maintenance of its public schools, in which there are nearly 200,000 pupils enrolled, with about 6,500 teachers. The state also maintains for higher education the University of W. at Seattle, the Agricultural College and School of Applied Science at Pullman, and state normal schools at Cheney, Ellensburg, and Bellingham.

Charities and Corrections.—These include an institution for the care and education of the blind, deaf, and feeble-minded at Vancouver; a reform school for juvenile offenders, located at Cheholis; two state hospitals, the Western W. Hospital for the insane at Steilacoom and the Eastern W. Hospital at Medical Lake; a soldiers' home at Orting; and a state penitentiary at Walla Walla.

History.—The earliest records show that a Greek

pilot named Juan de Fuca, who was in the employ of the Viceroy of Mexico, discovered the strait now bearing his name in 1592. He was followed in 1775 by a Spanish navigator, Captain Bruno Heceta, who discovered the mouth of the Columbia River but was unable to enter. Other early explorers and discoverers were Captain Robert Gray, who, on 11 May 1792, discovered the Columbia River, explored it for 15 miles and gave it the name of his ship; Captain George Vancouver, of the British navy, who in the same year explored Puget Sound and adjacent waters; Lewis and Clark (1805–6, who came in the first overland expedition sent out by President Jefferson and who after following the course of the Columbia River to its mouth, spent one winter in the vicinity; the military expedition of 1843, under Captain John C. Frémont, which reached Vancouver on the Columbia; the United States Naval Expedition of 1841, under Captain Charles Wilkes, which explored the waters of Puget Sound. In 1811 the traders of the Northwest Fur Company established posts in eastern W. and these were the first white settlers; they were followed in 1836 by Dr. Marcus Whitman, who established a settlement near the site of the present city of Walla Walla; and in 1845 by a settlement at Turnwater, on Puget Sound. For several years a dispute had been carried on between the United States and Great Britain over the ownership of the territory north of the Columbia River, both countries claiming ownership, the former by right of the discoveries of (1) Capt. Robert Gray, who, on 11 May 1792, entered the river called Oregon by the Indians, "afterwards sailed up the river 12 or 15 miles and left it on the 20th of the month, calling it Columbia after his ship;" (2) the expedition sent out by the U. S. Government in 1804, under Meriwether Lewis and William Clark, which encamped on the north side of the mouth of the Columbia, on Cape Disappointment, and remained there during 1805–6. The Americans claimed priority of settlement by reason of the post established in the spring of 1811 by a party party sent out by a company of which John Jacob Astor was the head. They made their settlement on the south side of the Columbia River, a few miles above Point George. This post was taken in the War of 1812 by the British, but was restored in 1814 by the terms of the Treaty of Ghent. The last claims of the Americans rested on the treaties of Louisiana with France in 1803 and of Florida with Spain in 1819, the latter of which gave the United States all Spain's rights, claims and pretensions to territory north of the 42d parallel and west of the Rocky Mountains. The English claims rested on the discoveries of Captain Cook in 1778, of Captain Vancouver in 1792, 1793 and 1794, of Mackenzie in 1793, and finally on a denial of the validity of the Spanish claim because Spain was

not strong enough in that territory to enforce any claim she might have had. The dispute was settled for a time in 1846 by the Buchanan-Packingham treaty, the British taking all the territory north of the 49th parallel, and the Americans all south of it with the exception of the south end of Vancouver Island. This parallel was accepted as the boundary to the channel between Vancouver Island and the mainland and thence down that channel to the ocean, but in 1859 another dispute arose as to which channel was meant, for upon this point hinged the possession of the Haro Archipelago, of which San Juan is the largest island. The dispute continued for a period of 13 years and was finally settled by the German Emperor, 1872, Oct. 21, in favor of the United States. The terr. of W. was organized 1853, March 2, and comprised all of Oregon N. of the Columbia River toward the W. and N. of lat. 46° toward the E., or what was then known as "the Vancouver district." In 1855–58 the settlers experienced much trouble from the Indians, who, becoming alarmed for their hunting grounds, resolved to exterminate the whites. In 1855 gold was discovered on the Fraser river, to which a rush of miners and adventurers was made, 1857–8, but the greatest rush took place after the discovery of gold at Salmon River in 1860. In 1885–6 took place the agitation against the Chinese, whose houses were burned and some of whom were murdered, but, after Seattle had been put under martial law in 1886 and the governor had called for Federal aid, the trouble gradually subsided. Many attempts to gain admission as a State were made by the people of W., the first in 1876, again in 1878, when a constitution was adopted but to no purpose, in 1881–3, when a bill was introduced into Congress but failed, and again in 1889, when on Feb. 22 Congress passed the Omnibus Statehood Bill admitting the two Dakotas, Montana and W. In 1889, Oct. 1, the State constitution was adopted and on Nov. 11 the State, in accordance with the provisions of the Enabling Act, was admitted to the Union.

Government.— The executive authority is vested by the constitution (1889) in a gov., lieut.gov., sec. of state, treas., auditor, atty.gen., supt. of public instruction, and a commissioner of public lands, all elected for 4 years. The legislative authority is vested in an assembly, comprising a senate of 42 members, elected for 4 years and a house of representatives of 94 members, elected for 2 years. The legislature is prohibited from authorizing any lottery, granting any divorce, engaging in private and special legislation, and was charged by the constitution with the provision of laws for specified state interests. Consolidation of competing lines of railroad is forbidden; monopolies and trusts are prohibited; the legislature may provide for woman suffrage at school elections; the ownership of

lands by aliens is prohibited, excepting where acquired by inheritance, under mortgage, or in good faith in the ordinary course of justice in the collection of debts; and the sessions of the legislature after the first one are limited to 60 days. The governor is given authority to veto separate sections of any bill. All male persons 21 years old who are citizens of the United States, residents of the state one year, the county 90 days, and the city, town, ward, or precinct 30 days, and all male persons who were qualified electors of the territory at the time of the adoption of the constitution, are eligible to vote. While the right of trial by jury is to be maintained inviolate, the constitution gives the legislature authority to provide for a jury of any number less than 12 in courts not of record, for a verdict by 9 or more jurors in civil cases in any court of record, and for waiving of the jury in civil cases where the consent of the parties interested is given thereto. The judicial authority is vested in a supreme court consisting of 5 judges whose terms are 6 years, and 25 judges of the superior courts elected for terms of 4 years.

The successive governors, with their terms of service, are as follows: Isaac I. Stevens 1853-57; J. Patton Anderson 1857; Fayette McMullin 1857-61; Richard D. Gholson 1861; Wm. H. Wallace 1861; Wm. Pickering 1861-67; Marshall F. Moore 1867-69; Alvin Flanders 1869-70; Edw. S. Salomon 1870-71; Jas. F. Legate 1871-2; Elisha P. Ferry 1872-80; Wm. A. Newell 1880-84; Watson C. Squire 1884-87; Eugene Semple 1887-89; Miles C. Moore 1889-90; Elisha P. Ferry 1890-93; John H. McGraw 1893-97; John R. Rogers 1897-1901; Henry G. McBride 1901-05; Albert E. Mead 1905-09; Samuel G. Cosgrove 1909—.

Counties, Cities and Towns.—Washington was divided (1905) into 36 counties. In 1905 the most populous *counties* were: King 195,574; Spokane 95,854; Pierce 87,308; Snohomish 50,200; Whatcom 44,126; Whitman 44,027; Yokmia 31,110; Walla Walla 29,570; Skagit, 24,272; Lewis 23,842; and Chehalis 19,742; and *cities and towns:* Seattle 154,703; Tacoma 71,000; Bellingham 26,000; Everett 26,000; Walla Walla 17,000; Ballard 12,000; Aberdeen 8,500; and Olympia 8,000.

Politics.—State elections are held on the first Monday in November in even numbered years, congressional and presidential elections on Tuesday after the first Monday in November. As a territory Washington had one representative (delegate) in congress. Under the apportionment on the 1900 census the state has 4 electoral votes and 3 representatives in congress. For the presidential vote, see PRESIDENT AND VICE-PRESIDENT, ELECTION OF.

Population.—(1860) 11,594; (1870) whites 22,195, colored 1,760—total 22,955; (1880) whites 67,199, colored 7,917—total 75,116; (1890) whites 340,513, colored 1,602—total 342,115; (1900) whites 515,589, colored 2,514—total 518,103.

WASHINGTON.

WASHINGTON, D. C.: the District of Columbia was established under the authority and direction of the acts of congress approved 1790, July 16, and 1791, Mar. 3, which were passed to give effect to a clause of the constitution of the United States giving congress the power 'to exercise exclusive legislation in all cases whatsoever over such district (not exceeding ten miles square) as may, by cession of particular states and the acceptance of congress become the seat of the government of the United States.' The territory obtained for this purpose lies in lat. 38° 53′ to 38′ n., long. 76° 58′ to 77′ w. from Greenwich. Originally 10 miles square, with the southern and part of its western extremity in the state of Virginia, it, through recession of the territory received from that state, became reduced in area to 69¼ square miles made up of what was once a part of Maryland. The site of the District of Columbia is at the confluence of the Potomac and the Anacostia or Eastern Branch rivers, 100 miles from Chesapeake Bay and 185 miles from the Atlantic Ocean. It rises from tide water lowlands at the rivers' banks through a series of hills to an extreme elevation, in some sections, of 400 feet. The district, as it is constituted, in former times comprised the villages of Washington and Georgetown, both of which are now included in the great federal city of Washington, whose government is unique.

The president of the United States and the two houses of the congress are to this city what the mayor and council are to other cities. The administration of municipal affairs is vested in three commissioners appointed by the president and acting under the sole authority of congress. One-half of the expenses of the government are paid from the revenues of the District and the other half by the United States. The estimated population in 1902 was 289,596, including 200,477 whites and 89,119 negroes. The estimated population in 1903 was 295,193; white 204,840; negroes 90,353. The climate is excellent. The mean average annual temperature for 33 years being 55 degrees; average summer temperature for the same period, 75; average winter, 35. The city is reached by six railroad lines, the Pennsylvania, the Baltimore and Ohio from the north and west, the Chesapeake and Ohio from the west, the Southern, Seaboard Air Line, and Atlantic Coast Line from the south, and by steamboat from Baltimore on the north and Norfolk on the south.

History.—By act of congress in July, 1790, a commission of three, with President George Washington at its head, was given authority to select on the Potomac river at some place between the mouth of the Eastern Branch and the Conocheague, a site, not to exceed 10 miles square, for a permanent capital of the United States. Within three days after the passage of the enabling act Washington announced the selection of the present site of the city which bears his name. The original acts of

congress relating to the District referred to it as the seat of government. Washington called it the Federal City, and the commission which had charge of it after the death of the first president knew it as the City of Washington in the Territory of Columbia. Congress finally accepted the name of Washington for the city and called the territory surrounding and including it, which was gained by cession from the states in which it lay, the District of Columbia. Major l'Enfant, a French engineer serving in the Continental army, who was employed to superintend the laying out of the city, followed plans outlined by Washington, derived, it is believed, from the outlines of Versailles, France. Washington and l'Enfant frequently rode over the site of the city together and the plans they decided upon were afterward developed and carried out, as far as they could be, by Andrew Ellicott, a Pennsylvania engineer, who was employed on the work after l'Enfant—thoroughly discouraged because of obstacles placed in his way by unsympathetic commissioners—had resigned his position. The scheme of the city as originally decided upon, made the capitol building, located on the western edge of a high plateau, the point from which most of the streets and avenues radiated. Straight lines run through the centre of the building, north and south, east and west, divided the city into four sections, known respectively as northwest, northeast, southwest and southeast. The streets were run with practically unswerving accuracy parallel to the marks of division, those streets running east and west being lettered and those north and south numbered. The avenues were planned to intersect the streets at various angles. The streets which followed the dividing lines were known as North Capitol, East Capitol and South Capitol; the western line running through a great expanse of parking directly to the Potomac river from the capitol. This parking reservation, or series of parks, was called the Mall and was designed to be the most beautiful section of the city, with the public buildings erected along the northern and southern sides. The cornerstone of the capitol building, the first public edifice to be erected, was laid 1793, Sept. 18. The seat of government was removed from Philadelphia in 1800, and in November of that year the national legislature met in Washington for the first time. At the outset congress placed city affairs in the hands of three commissioners; but, not pleased with the results of the experiment, in 1802 the city of Washington was made a corporate town with a mayor, a board of aldermen and a common council. The first mayor was appointed by the president, but all the later incumbents of the mayoralty were elected to office by the people. Georgetown and Alexandria, towns which existed prior to the Revolution, and which were included in the Federal District when that was originally laid out, remained corporate towns with independent municipal governments.

In 1814 the city was captured by an expeditionary force of British soldiers and all the public buildings, including the capitol and the White House, were destroyed by fire. During the first 70 years of its existence as the capital of the United States, Washington was apparently nothing more than one of the most forlorn of villages. No serious effort was made toward ordinary municipal betterment. The United States paid no taxes on the property it held and only made the smallest appropriations for maintenance of the capital city. This lack of public spirit lost to the District the Virginia territory which was receded to the state on the petition of the citizens of Alexandria in 1846. The creation of a territorial form of government in 1871, which brought the whole district under federal control again, marked the beginning of the era of improvement, which is even now progressing. The board of public works, established co-incident with the creation of the territorial government, originated and pushed the great public improvements despite the obstacles it faced in the shape of the prejudices of the people. The city was cleaned and renovated; those lines of the Washington-l'Enfant plans which had been ignored or obliterated were re-established and the foundations of the Washington of to-day were laid. The city was left in such a state that when the present form of government was adopted the work was continued as an absolute necessity. Dissatisfaction with the territorial government developed, however, and after experimenting four years the present system was finally established by an act of congress 1878, June 11.

Government and Relations with the General Government.—The District of Columbia now enjoys a unique form of government, which is seemingly at variance with all republican principles and yet which reflects, as does nothing else in the United States, the idea of a 'government for the people, of the people, and by the people.' The citizens of the United States rule their capital city. The people of the capital have no part in it. Three commissioners, one from each of the two dominant political parties and one an officer of the engineer corps of the army, are appointed by the president, with the 'advice and consent of the senate,' to administer the affairs of the district for terms of three years each. These officials are paid $5,000 per year for their work. The salary of the engineer officer detailed for the work is made to equal this amount by additions to his regular pay. All subordinate officers of the government are appointed by the commissioners. Two assistants from the corps of engineers of the army are detailed with the engineer commissioner. The other members of the triumvirate have no assistants. There are two sets of laws in force. One, acts of congress, corresponding to state laws in other communities; two, municipal regulations enacted by the board of commissioners, taking the place of the munici-

pal laws of other cities. The commissioners have no power to appropriate the money used in the government. Every cent is appropriated specifically by congress. An annual report is made to the congress through the president, which contains the annual report of all subordinate officers of the government. The congress determines upon all public improvements, through committees of each house appointed for the purpose. Nothing can be done, not even so little a thing as the purchase of a box of friction matches, without authority from the congress. The expenses of the district government are paid, one-half from the revenues of the district and one-half from the treasury of the United States. The revenues of the district are derived from taxes on real and personal property and licenses of various sorts. The levying of the taxes is in the hands of an assessor, who has subordinate to him a board of assistant assessors and a board of personal tax assessors, together with such license clerks, etc., as are necessary to carry on this part of the business of the government. A collector of taxes has charge of the collection of all taxes and license fees. The accounts are audited by an auditor, who has an assistant and a large force of bookkeepers, accountants, etc. The police power is vested in a police department consisting of one major and superintendent, one captain and assistant superintendent, four captains and aids to the superintendent, 10 lieutenants who have direct control of the policemen, 35 sergeants, and 642 privates. The city is divided into 10 police precincts, each presided over by a lieutenant. The judiciary of the district includes one supreme court, a court of appeals and a police court. The supreme court of the district includes one chief justice, five associate judges, and one United States marshal. It is so divided into criminal, equity, circuit, and probate courts that it transacts in this jurisdiction the same business as that which is accomplished by the federal, state and municipal courts of other localities, the members of the bench alternating in the various branches. The court of appeals has one chief justice and two associate justices. This court hears appeals from the district supreme court and also from the commissioner of patents. The police court consists of two branches, each presided over by a police justice. One branch attends to violations of the municipal regulations and the other to infractions of United States laws. In all the courts, but the last named, the justices are appointed by the president for life terms. In the police court the justices are appointed for terms of four years each. Connected with the supreme court there is a register of wills and a recorder of deeds. The maintenance of true lines of streets, etc., is charged to the surveyor's office, which includes in its force one surveyor and his assistants, all under the control of the engineer commissioner. The sanitation of the city is under the charge of a health officer, who has a

deputy and numerous inspectors. A superintendent of street cleaning, assisted in the work by about 400 men, has charge of the cleaning of the streets, much of which is done by the hand cleaning system. The city fire department consists of one chief engineer, four assistants, one fire marshal, one machinist, 14 steam engine companies, five chemical engine companies and six truck companies, each of the detachments or companies being under the control of a foreman and one assistant. There is an engineer department under the direct control of the engineer commissioner. The divisions of city government enumerated above, together with the other subordinate departments, are presided over by the two civilian commissioners, each having his special departments for control and observation. It requires, however, a majority vote of the whole board to determine any question of policy in carrying out the acts of congress relating to the district. The congress exercises a most jealous care of the district. Its appropriations are made separate and distinct for every department of the municipal structure, the smallest items being provided for specifically. In addition to going through the hands of the auditor for the district, they are carefully scrutinized by the auditor for the state and other departments and the comptroller of the treasury. All money is disbursed by an officer appointed for the purpose by the commissioners. This officer has no connection with any of the other departments. A handsome municipal building for housing all branches of the city government has been constructed. The water supply of the district comes from the Potomac river at a point about 15 miles above the city. It is carried through an aqueduct from the river to large storage reservoirs and from these is pumped into the city. A filtration plant has been erected near the Soldiers' Home, which covers 29 acres of ground and is sufficient to filter all the water used in the city. The water is of excellent quality, free from impurities, although at times it is very muddy. It is drawn from the mountain streams of the Alleghanies which empty into the Potomac in the Cumberland valley. The water supply, with everything relating to it, is under the charge of the United States government, by which it is owned. A nominal water rent is charged consumers.

Education.—The public school system of the district is said to be the finest in the United States. It is under the control of the commissioners through a board of education composed of seven members. The administration of the affairs of the schools is all in the hands of this board, which is made up of prominent citizens, who receive a nominal fee or salary. The head of the school system is a superintendent who is aided by two assistant superintendents having control of the colored and white schools respectively, and by a secretary, who is the official representative of the board in all affairs of the

schools. The board of education controls all appropriations for the schools and makes all contracts for materials and buildings, with the consent and approval of the commissioners. The school system includes eight grades of primary and grammar schools and a high school course with military instruction for the boys. At the end of his work in the graded schools a pupil may elect either an academic, a scientific, a business or a technical course in the secondary schools. After passing through four years in the academic high school a pupil may prepare himself for appointment as a teacher by a two years' course in the normal school. The total enrollment for the school year is about 50,000, of which 35,000 are white pupils and 15,000 are colored. These pupils are enrolled in 1,100 schools, including normal schools, high schools, manual training schools of different grades, grammar, and primary schools and kindergarten. There is also a good system of night schools. The number of teachers employed in the various schools of the city is approximately 1,500. Washington is also the seat of many universities, colleges, seminaries, academies and private primary schools. The Catholic University of America (q.v.) is situated in one of the northern suburbs of the district near the head of Lincoln avenue. This institution was first organized in 1885 under the direction of the Catholic hierarchy of America, but was not actually established until the fall of 1889. It is one of the foremost institutions in the country for the study of the advanced branches of science and philosophy. The oldest institution of learning in the district is the Georgetown University (q.v.), founded by Archbishop Carroll, of Baltimore, in 1789, and conducted under the direction of the Jesuit Order of the Roman Catholic Church. This university occupies a magnificent park on the heights above Georgetown and has all the departments of a modern university, with its law and medical schools located in the downtown section of Washington. Connected with the medical school is a well equipped, modern hospital, located in Georgetown near the university proper. The oldest college or seminary for women is the Georgetown Convent, established also by Bishop Carroll, in 1798. It receives young women of the Roman Catholic faith and educates them in all the higher branches of learning. It also receives novices for the orders of sisterhood. Howard University (q.v.), established by an act of congress in 1867 and supported almost entirely by the government, furnishes opportunities for an education to the negro. This institution has medical, dental and law departments as well as the regular academic course It also fits young men for the ministry and has a preparatory department. The Presbyterian Church has had much to do with its development, although the government makes annual appropriations for its maintenance and for the maintenance of the Freedman's Hospital, in connection with which the university

medical department is operated. The Columbian University was chartered in 1821 and up to 1904 was under the direction of the Baptist Church. The sectarian clause in its charter was removed by act of congress during the early months of 1904, and at the same time the university was given permission to change its name. The new title is the 'George Washington University' (q.v.). It includes all the departments of a well-equipped university: legal, medical, dental, scientific, and collegiate. In addition to these, the institution established a few years ago a school of diplomacy and jurisprudence in connection with its law school, and a modern well-equipped hospital in conjunction with its medical department. Trinity College, a Roman Catholic institution, situated near the Catholic University of America, was formally dedicated in November, 1900. It was designed for the higher education of women and is conducted by the Sisters of Notre Dame de Namur. The new Academy of the Visitation, on Connecticut avenue, between L and M streets, was established 1850 as an offshoot of the Georgetown Convent. It is designed for the education of girls and is one of the best schools in the district. The Academy of the Holy Cross, another Roman Catholic institution of learning, primarily planned for the education of little girls, was founded in 1868 and is under the charge of the Sisters of the Holy Cross. The Christian Brothers conduct the St. John's College, an institution that instructs young boys in the lower branches of learning and prepares them for college. Gonzaga College, carried on in connection with the Society of Jesus, is one of the finest preparatory schools in the country. It has a battalion of cadets and a band, all composed of students. The National University was established about 1870, the intention being to create a national institution on the lines recommended by George Washington. This university has no collegiate course, but has schools of law, medicine, dentistry, and pharmacy. Recently the medical and dental branches became a part of the Columbian University. The Columbian Institution for the Deaf and Dumb, known also as Gallaudet College, was incorporated by congress 1857, Feb. 15. Amos Kendall, a prominent citizen of the district and a well-known philanthropist, had much to do with its organization. It is situated in a beautiful locality in the extreme northeastern section of the city of Washington. The first superintendent was Edward Miner Gallaudet, whose son is now its president. The school for the deaf in connection with the institution is known as the Kendall School. The collegiate department is named Gallaudet College, in honor of the Rev. Thomas Hopkins Gallaudet. Congress makes an annual appropriation for the maintenance of the institution. The American University is under the direction of the Methodist Church, and is one of the finest institutions of its kind in the country. This organization owns a large tract of land in the suburbs near

Tenleytown. Washington is peculiarly situated regarding scientific institutions. The numerous government bureaus bring to the city a vast concourse of eminent men of science. The most important of these institutions are the naval observatory, the Smithsonian Institution (q.v.), the geological survey, the coast and geodetic survey, the public health and marine hospital service, the national bureau of standards, the various bureaus of the department of agriculture, and the museums and laboratories of the army and navy medical departments. All of these bureaus or offices pursue the study and development of special branches of science, and their libraries are among the most valuable, on the subjects considered, in the world. Connected with the Smithsonian Institution is the National Museum, in which is gathered a collection of subjects relating to the various branches of the sciences and to the history of the United States. Each is presided over by an eminent master of science and each offers an almost limitless opportunity for research. For the benefit of those who desire to engage in study along any of these lines, but who have not the means to accomplish their desires, an institution has been established, known as the Carnegie Institute, to which Andrew Carnegie presented $10,000,000 with which to carry on the work. Washington possesses a public library, through the munificence of Mr. Carnegie, which cost $300,000. Mr. Carnegie has also given a sufficient sum for the purpose of establishing branch libraries. The Library of Congress (q.v.) forms, perhaps, the largest institution of its kind in the United States. It is open to all the people, and is especially patronized by residents of the district. The Corcoran Art Gallery, a handsome structure containing copies and originals of famous works of art from all sections of the world, is closely related to, yet independent of, the educational institutions of the government. In addition to the Library of Congress each department of the general government has its library and there are also valuable libraries connected with the army and navy medical museums, the former being the best of its kind in the world. The law library of the Bar Association of the district is a very valuable institution, situated in the city-hall, where the District Supreme Court is housed. Each departmental library contains volumes relating particularly to the work of that department.

The peculiar conditions governing Washington physically have their effect on its moral government. The humane institutions of the capital city are divided into three classes. First, those supported entirely by the combined general and local government; next, those supported partially by the same government combination; and third, those maintained solely by private means. In the first class are the Washington Asylum, including the work house, an institution for correction, and the alms

house with a hospital to which the sick of both these institutions are sent; the Municipal Lodging House; the Soldiers' and Sailors' Temporary Home; the Soldiers' Home; the Board of Children's Guardians; the Industrial Home; Freedman's Hospital for Negroes, and the Government Hospital for the Insane. In the second class are the Columbia Hospital for Women, Children's Hospital, National Homeopathic Hospital, Providence Hospital, Garfield Hospital, Central Dispensary and Emergency Hospital, Eastern Dispensary and Casualty Hospital, Woman's Clinic, Washington Home for the Incurables, National Association for the Relief of Destitute Colored Women and Children, Working Boys' Home and Children's Aid Association, Washington Hospital for Foundlings, St. Ann's Infant Asylum, German Orphan Asylum, Woman's Christian Association, Young Woman's Christian Home, Florence Crittenton Hope and Help Mission, Aid Association for the Blind, Woman's Dispensary. The third class includes many institutions and associations which have for their object the caring for sick and incapacitated persons. Under this head come the two university hospitals, Georgetown and Columbian, and several charitable organizations. The Government Hospital for the Insane, including a tract of several hundred acres of land, is situated on the south bank of the Eastern Branch. The institution was primarily designed for insane soldiers and sailors of the United States, but it receives besides these indigent insane persons of the District of Columbia. This is regarded as one of the foremost institutions of its kind in the country. A superintendent, appointed by the secretary of the interior, reports to the interior department annually as to the progress and condition of the affairs of the institution. A board of visitors, composed of prominent citizens of the country, has indirect supervision over the hospital and its surroundings. The second largest public institution conducted by the government is the National Soldiers' Home, situated in the suburbs north of the city. This institution furnishes a home for the soldiers of the regular army after retirement either through age or disability. It is governed by a board of army officers. The 502 acres which it occupies are fitted up with a number of handsome buildings, among which is a well-equipped hospital, presided over by a surgeon of the regular army. Washington has numerous private charities and institutions for charitable purposes in connection with the various churches and religious organizations. The charities of the district are superintended by a board of prominent citizens known as the board of charities; appointments to this board are made by the president of the United States.

Streets, Avenues, and Parks.—The wide streets and avenues and the numerous parks and parking spaces form the feature which most distinguishes Washington from

other cities. Within the limits of the district there are 447.53 m. of paved streets, of which amount 128.03 are asphalt and coal tar; 21.87 asphalt block; .52 vitrified brick; 27.34 granite block; 9.18 cobble stone; 71.36 macadam, and 189.25 gravel. The gravel pavement is practically all in the parks and in the suburbs, so that it cannot be taken as an indication of the treatment of the city streets. The mileage of asphalt streets is greater, it will be seen, than the mileage of all the other pavements, except gravel, put together. The distinctive feature is the slight use made of cobble stone in the pavements. Only 9.18 m. of street are paved in this manner, and these are rapidly giving way to asphalt or asphalt block. The system of streets laid out by Washington, l'Enfant and Ellicott has been strictly adhered to. There are 21 avenues named after the various states. The streets and avenues are never less than 60 feet wide, and vary from 60 feet to 160. Pennsylvania avenue, which is the broadest street, is paved with asphalt almost its entire length, from the Eastern Branch to Rock Creek. Much of the property controlled by the United States is in public parks. Wherever an avenue intersects a numbered or lettered street the space between the avenue and street intersected, often an entire block in length, is converted into a public park. Many of these small parks are equipped with fountains and shrubbery, and in all of them flowers are grown in huge masses during the proper seasons. These are under the direction of the superintendent of public buildings and grounds, an officer of the engineer corps of the army. The largest park in the city proper is called the Mall, which extends for about a mile and a half from the capitol building to the Potomac river and from B street south to B street north, giving it a width of four city blocks. It contains 230 acres. In the l'Enfant plan it was intended to improve this park by making a long vista or avenue, extending from the (then proposed) Washington monument to the capitol, on the order of the Versailles garden. This has never been done, although recommended from time to time by architects and artists. The most recent recommendation was that of a distinguished commission of architects known as the park commission, appointed by the chairman of the senate committee on the District of Columbia to study the treatment of the parks in the capitals of Europe and to prepare a report as to what could be done in Washington. This report was presented to congress in 1902, and provided for the expenditure of $100,000,000 and the purchase by the government of all the property lying between Pennsylvania avenue and the Mall on the north and between Maryland avenue and the Mall on the south. The grounds surrounding the Soldiers' Home and in Rock Creek Park are the most extensive public reservations in the district. The former park is lined and interlined with drives of every sort. In the

summer these are made most delightful by the great variety of foliage of the trees and the care taken in the cultivation of flowers and shrubbery. The Rock Creek Park, a vast tract of 1,775.9 acres, acquired by the government during the last 20 years, is designed for a great national park. The government's zoological collection finds a home in one corner of this tract, which extends from the city limits to the district line and through which flows Rock creek. The government owns most of the land for a considerable width along Rock creek from the district line to the point where it empties into the Potomac near the western extremity of the Mall, and the plans of the park commission provide for a system of driveways which will eventually connect Rock Creek Park with the capitol building. The government has in the course of improvement a large tract of land known as Potomac Park, including a great area which has been reclaimed by dredging from the flats along the western and southern river front. This property is rapidly yielding to improvements which will make it one of the finest parks in the world. The Mall is connected with the parking surrounding the White House, the Treasury and State departments, by a reservation known as the President's Park or White Lot, lying directly north of the Washington Monument. At points where two or three streets and avenues intersect, a small circular bit of parking is created, and in this, too, statuary has a place. This is shown by Lafayette Park, opposite the White House; Lincoln Park, at 11th and East Capitol streets; Garfield Park, between Third and Sixth and D and E streets southeast; Scott Circle, Thomas Circle, McPherson Square, etc. The parking about the capitol building is very extensive and highly improved. Statues of Washington, Chief Justice Marshall and Garfield are found in and about this park. Statues of Scott, Farragut, Thomas, McPherson, Lafayette, Rochambeau, Jackson, Washington, and many other famous soldiers and statesmen are found at various points throughout the city, in a majority of cases in parking spaces named in honor of the men whose statues adorn them.

Commerce.—Washington's commercial interests are small. Manufacture is carried on in the city in a very limited degree, although a large sum of money is invested in plants and material, and the value of the output is considerable. To a great extent the goods turned out are for home consumption only. The census report for 1900 shows that there are 2,754 manufacturing establishments with a total capital of $41,981,205. In these establishments are employed 24,628 persons, who are paid in wages $14,643,714 annually. Raw materials used were valued at $19,369,571; the product at $47,667,622.

Public Buildings.—Because of the stringent building laws in the district the skyline of Washington will never be disfigured by tall office buildings. The law requires

that no building shall exceed in height the width of the street on which it fronts. The public buildings are many and of fine architecture, as are also hundreds of the private residences. The largest and most important building is the capitol situated on a high plateau 88 feet above the level of the river. The central portion of the building was begun in 1793, in September of which year the corner stone was laid by President Washington. This part of the structure is built of sandstone quarried on Aquia creek, Va., a few miles below Washington, and cost up to 1827, $2,433,844.13, which included the expenditures made necessary by repairs after its destruction by the British on Aug. 24, 1814. The corner stone of the extensions or wings was laid 1851, July 4, by President Fillmore, Daniel Webster officiating as orator. These extensions were completed in 1859. The building is 751 feet 4 inches in breadth and 350 feet in depth. The area covered by the building is 153,112 square feet, with a height from a base line at the east front of 287 feet 5 inches. The total cost of the capitol building was about $14,000,000. Next to the capitol itself the library of congress is the most important structure in Washington. This was completed in 1897 and cost the government $6,347,000. It contains the great national library and 45 m. of shelving, sufficient to hold 2,200,000 octavo volumes (see LIBRARIES). The treasury department, at the corner of Fifteenth street and Pennsylvania avenue, the oldest of the departmental buildings, is constructed of freestone and granite in the Ionic style and cost $7,000,000. On Pennsylvania avenue between Eleventh and Twelfth streets is the new city post-office and post-office department. This building, constructed entirely of granite, occupies an entire block. It is one of the handsomest structures of the modern style of architecture. The state, war and navy departments occupy a large granite structure built in the Renaissance style of architecture at the corner of Pennsylvania avenue and Seventeenth street. This building occupies more than four and a half acres and cost $11,000,000. It is said to be the handsomest structure in Washington, excepting the capitol and library buildings. The building popularly known as the patent office, but which is really the secretary's office of the interior department, is a large structure of white marble of a pure Doric style. It cost $3,000,000, and occupies the two blocks between Seventh and Ninth and F and G streets northwest. Opposite this building, fronting on F street, is the old building of the post-office department, a structure built of marble in the Corinthian order of architecture, covering one block. This building is occupied by the general land office and Indian bureau. The pension bureau is housed in an imposing brick structure in Judiciary square, near the corner of Fifth and F streets northwest. Here have been held many of the great functions known as inaugural

balls. The old city-hall building, now occupied by the District Supreme Court and Court of Appeals, is one of the old city buildings. It is situated in Judiciary square, fronting on D street and Louisiana and Indiana avenues, at the head of Four and a Half street or John Marshall place. The home of the president, fronting on Pennsylvania avenue, between the treasury department and the state, war and navy building, is an artistically plain building of freestone painted white, from which it derives the name of White House. This was one of the buildings partially destroyed by fire in 1814 at the time the British burned the city. The offices of the president are contained in a low white building, built of brick, at the western extremity of a long colonnade extending from the White House. Directly south of the White House is the Washington Monument, a marble shaft 555 feet in height, to the building of which almost every country on the face of the earth contributed a stone. An elevator is run to the top of the building, from which a fine view of Washington can be obtained. The Washington Public Library, the gift of Andrew Carnegie, occupies a parking space known as Mount Vernon square, at the intersection of Seventh, Eighth, Ninth, and K streets and Massachusetts and New York avenues. This beautiful building was opened in 1902. On the south side of the Mall near Ninth street is the Smithsonian Institution, a building of brown-stone in the ancient Gothic style of architecture. It is one of the handsomest structures in the city and was built with money bequeathed by James Smithson, an Englishman. Adjoining it on the east is the National Museum. Near the museum are the army medical museum and the fish commission buildings. To the west of the Smithsonian Institution is the building of the department of agriculture. Congress, in 1903, appropriated money for a new building for this department. Near the department of agriculture is the Bureau of Engraving and Printing, where all the paper money, stamps and bonds are made. The government printing office, the largest and most complete printing establishment in the world, is housed in a huge brick structure on the block bounded by North Capitol and First and G and H streets northwest. The senate office building was opened in 1909. The large public buildings also include the naval observatory, the naval museum of hygiene and the coast survey buildings. New buildings are about to be constructed for the department of justice, for the Supreme Court of the United States, for the bureau of standards, and for the safe-keeping of government records. There is also a union station building, which is one of the finest and most commodious of railroad terminals. It cost about $5,000,000 when finished, and the approaches to it cost about $11,000,000. Part of the expense of changing grades, etc., was borne by the United States and district governments. There are many

large buildings owned by private individuals or corporations which add to the architectural beauty of the national capital. Among these are the *Evening Star* building, the Southern Railway building, the Lafayette Square Theatre, the New Willard Hotel, the Shoreham Hotel, the Cosmos Club, the Georgetown University, the Catholic University, the McKinley Manual Training School, and the buildings of the Soldiers' Home.

Military.—Washington as the headquarters of the army and navy has three public reservations devoted exclusively to these branches of the public service. The most important of these is the navy yard, containing gun shops in which all the large guns for the vessels of the navy are made. Here also is a huge tank in which models of naval vessels are tested for speed, displacement, etc. Connected with the navy yard is a museum of arms and ordnance. Near the navy yard is situated the marine barracks, covering an area of two city blocks. The largest military reservation in or near the district is Fort Myer, originally established on the heights above Washington on the Virginia shore of the Potomac, as a post for the signal corps and named in honor of Gen. Myer, the officer who established the signal corps as a part of the army but who is better known for having established the weather bureau. At Fort Myer barracks and quarters are maintained for four troops of cavalry and two batteries of field artillery of the regular army. The reservation at Fort Myer adjoins the Arlington National Cemetery and includes a portion of the old Custis estate. In Washington is situated the Washington Barracks, now the seat of the Army War College and the School of Application for the engineer corps of the army. This is the oldest military post in this section of the country, having been established prior to the war of 1812 as an ordnance storage post. On this reservation the statue of Frederick the Great, the gift of the Emperor of Germany, was erected in 1904. Here also is the site of the old military prison, where the conspirators who were charged with complicity in the assassination of President Lincoln were tried, sentenced and those given the death penalty were executed. Near Washington are Forts Washington, Hunt and Foote, all of which are on the Potomac river below the city. The organized militia of the District of Columbia numbers about 1,700 men grouped into one brigade of two regiments and one separate battalion, including 28 companies of infantry; one battery of field artillery, one engineer corps, one signal corps, one ambulance corps and one naval battalion. The brigade is commanded by a brigadier-general who with his staff and all the line officers are appointed by the president. The adjutant-general of the district militia is an officer of the regular army detailed by the war department.

Churches.—Washington has some of the finest church

buildings in the country; 17 sects are represented, with 163 places of worship. The Episcopalians head the list with 31 churches; the Methodists have 27; Presbyterian, 22; Catholic, 17; Baptist, 16; Lutheran, 15; Methodist Episcopal South, 6; Methodist Protestant, 6; Congregational, 4; Christian (Campbellite), 4; Friends, 4; Reformed, 2; Hebrew, 2; Swedenborgian, Unitarian, United Brethren and Universalist, 1 each. In addition to these there are three organized societies of Christian Scientists; two Spiritualistic societies, one Progressive Brethren and two non-sectarian, the People's and the United States Christian. The aggregate membership in all these organizations is considerably over 60,000. The amount of property held by religious orders or organizations which is exempt from taxation and is used for religious purposes has an assessed valuation of $6,405,702, this, in addition to the property held by such organizations for educational or charitable purposes, which is also exempt from taxation. The best known churches in Washington are the New York Avenue Presbyterian Church (Lincoln's Church), the Metropolitan Methodist Episcopal Church, attended by Presidents McKinley and Grant; the Church of the Covenant (President Harrison's church), the First Presbyterian Church (President Cleveland's church), and Saint John's Episcopal Church, the most fashionable church in Washington. To this list might also be added Grace Dutch Reformed Church.

Cemeteries.—There are nine large cemeteries in or near the district. The largest is the Arlington National Cemetery, the old Custis estate on the Virginia side of the Potomac river overlooking the city. This is the magnificent estate owned by Gen. Robert E. Lee, which was seized by the general government. The old mansion yet remains preserved in excellent condition. On the broad hillsides sloping from the mansion to the river lie buried many of the soldier dead of the country, with Sheridan, Crook, Lawton, and Admiral Porter among the most prominent men whose last resting place this is. Here also can be found the graves of the men who perished in the Maine and many of those who died from wounds and disease in Cuba and the Philippines, together with the graves of thousands of Union and Confederate dead of the civil war. At Soldiers' Home the inmates of the home are buried, and many a veteran finds his last resting place here. Another national cemetery is that at the extreme end of Seventh street road known as the Battle Ground Cemetery. Washington has but one crematory for the dead. In addition to the cemeteries included in the figures given above there are several devoted exclusively to negroes and one or two for the Hebrew dead.

Society.—The national capital is rapidly becoming the social and educational center of the United States. Persons of great wealth from all sections of the country are flocking to the city during the sessions of congress, many

such persons having built large residences here. The city, as the focal point of governmental activity, attracts large numbers of people of all classes, making the social season one of great interest and activity. The clubs and theatres are among the best in the country. The most important clubs are the Army and Navy, Cosmos, Metropolitan, University, Alibi, Chevy Chase, and Country. The two last named are country clubs, having handsome club houses in the suburbs. In addition to these there are a number of smaller clubs and club houses. There are seven theatres in the city.

Newspapers.—Almost every daily newspaper of consequence in the United States has an office in Washington, some of the largest papers supporting resident staffs with regular organization throughout the year, while others maintain correspondents during the sessions of congress. There are three large daily newspapers in Washington, the *Evening Star,* an afternoon paper owned by the Evening Star Newspaper Company, of which S. H. Kauffman is president and Crosby S. Noyes editor; the Washington *Post,* owned by the Washington Post Company, of which Beriah Wilkins is the president and editor, and the Washington *Times,* owned by Frank A. Munsey. There are several weekly and monthly publications, which enjoy a large circulation. See also DISTRICT OF COLUMBIA.

WASHINGTON: village, county seat of Wilkes co., Ga.; on the Georgia Railroad; about 55 m. in direct line, n.w. of Augusta. It is the northern terminus of the Washington Branch Railroad (Georgia Railroad) which connects at Barnet with the main line. Mineral springs, noted for their medicinal properties, attract here many health-seekers. The surrounding country is devoted mainly to agriculture. The manufactures are flour and lumber products. The principal buildings are the county court-house, six churches, and the schools. It has a high school, opened in 1893, St. Joseph's Academy (R. C.), public and parish schools, and St. Joseph's Orphanage. Pop. (1900) 3,300. The population of the town of Washington, which is a part of the village in industrial and commercial life, is 3,000.

WASHINGTON: city in Tazewell co., Ill.; on the Chicago & Alton, the Toledo, Peoria & Western, the Atchison, Topeka & Santa Fé R.R.'s; about 11 m. e. of Peoria and 65 m. n. of Springfield. It is in an agricultural region. It has wagon and carriage works, a furniture factory, flour mill, and grain elevators. There are a public high school, established in 1876, a public library, and two private banks. Pop. 1,700.

WASHINGTON: capital of Daviess co., Ind.; on the Ohio & Mississippi and the Evansville & Terre Haute R.R.'s; 20 m. n.e. of Evansville, equidistant from Cincinnati and St. Louis. It is in an agricultural, stock-

raising, and coal-mining region. Extensive shipments are made of coal, grain, live-stock, flour, and vegetables. There are nine large coal mines in the vicinity. The industries of Washington include railroad shops, flour mills, foundry and machine shop products, canning, cooperage, and underwear. There are four banks at Washington. The educational establishments include a high school and St. Simon's Academy. There are several churches. Pop. (1900) 8,551. (1910) 7,854.

WASHINGTON: city, capital of Washington co., Ia.; on the Chicago, Rock Island & Pacific and the Burlington & Northwestern R.R.'s; 75 m. s.w. of Davenport. It contains county court-house; churches; public schools; academy; Roman Catholic school; public library; banks, national, savings and private; periodicals, daily and weekly; grain elevators; pipe organ works; carriage-works; brick and tile factories, creameries, machine works; mills, etc. The making of cob-pipes and mittens is carried on extensively, and Washington is the centre of trade for a large agricultural region. Pop. 4,300.

WASHINGTON, Kan.: city, county-seat of Washington co.; on Mill Creek, and on the Chicago, Burlington & Quincy and the Missouri Pacific R.R.'s; about 90 m. n.w. of Topeka. It is in an agricultural region, in which the principal products are wheat and corn. Stock-raising is given considerable attention. The industries are connected chiefly with the farm products and the shipment of live-stock. There are a high school, a Friends' Academy, two national banks, two private banks, and a private business school. Pop. 1,750.

WASHINGTON, La.; town in Saint Landry parish on the Bayou Courtableau, and on the Southern Pacific R.R.; about 168 m. n.w. of New Orleans. It is at the head of navigation on the bayou, and has opportunities for shipping freight by water that make it a commercial centre for a large part of the parish. There are brick and tile works, a cotton twine and yarn factory, cotton mills, and a machine shop. The principal shipments are rice, cotton, sugar-cane, and corn. The State bank has a capital of $50,000. Pop. 1,250.

WASHINGTON, Me.: town in Knox co.; about 25 m. e. by s. of Augusta. It was incorporated in 1811 and called Putnam; in 1823 the name was changed to Washington. The town contains several villages, in all of which there are manufacturing interests; the principal manufactures are barrels, staves, headings, undertakers' supplies, cabinet work, and lumber. There are five churches, a high school, and district schools. Pop. (1900) 1,019; (1910) 814.

WASHINGTON, Mo.: city in Franklin co.; on the Missouri Pacific R.R.; about 55 m. w. of St. Louis. It is in a fertile agricultural region. It has manufactories

of lumber, flour, shoes, cob-pipes, leather, musical instruments, agricultural implements, and furniture. There are made extensive shipments of packed beef and pork, wheat and corn, and lumber products. There are six churches, public schools, Roman Catholic and Lutheran schools. The city has two banks. Pop. 3,100.

WASHINGTON, N. J.: borough in Warren co.; on the Morris Canal, and on the Lackawanna R.R., about 61 m. w. of Newark, and 12 m. n.e. of Easton, Pa. It is near the base of Scott Mountain, on the s. side, and is in an agricultural region. The chief manufacturing establishments are piano and organ factories, silk mills, machine shops, and furniture factory. There are six churches, a high school, founded in 1882, public elementary schools, and a school library. There are two banks. Pop. (1900) 3,580; (1910) 3,567.

WASHINGTON, N. C.: town, county-seat of Beaufort co.; on the Pamlico River, and on the Atlantic Coast Line Ry., 103 m. n.e. of Wilmington, N. C. It is at the head of navigation on the river, has freight connections by water with the Atlantic coast ports and the West Indies. There are grain elevators and large warehouses; the principal exports are fish, vegetables, flour, and fruit. The town also contains barrel and sash factories, lumber and planing mills, and steam cotton gins; oyster fishing is an important industry. There are two banks, one of which is a State bank with $50,000 capital. The town has a high school, founded in 1899, with a school library of about 1,400 volumes. Pop. (1910) 6,211.

WASHINGTON, capital of Fayette co., O.; on Sugar Creek, and on the Cincinnati & Muskingum Valley, the Colorado & Cincinnati, the Dayton, Fort Wayne & Chicago, and the Ohio Southern R.R.'s; 35 m. s.e. of Springfield, 77 m. e.n.e. of Cincinnati. It is in an agricultural region, and manufactures agricultural implements, boots and shoes, lumber, and woolen goods. There are several machine shops, planing and flour mills. There are churches and daily and weekly newspapers. Pop. (1900) 5,751; (1910) 7,277.

WASHINGTON: capital of Washington co., Penn.; on Chartiers Creek, and on the Baltimore & Ohio, the Pittsburgh, Cincinnati, Chicago & St. Louis, and the Waynesburg & Washington R.R.'s; 32 m. s.s.w. of Pittsburgh, 32 m. e.n.e. of Wheeling. It is engaged in bituminous coal-mining; is the seat of Washington and Jefferson College (Presb.), organized 1802; and contains churches, court-house, manufactories of flour, cigars, carriages, and woolen goods, and daily, weekly, and monthly periodicals. Pop. (1910) 18,778.

WASHINGTON, Mount: in New Hampshire, the highest peak of the White Mountains, and the highest point in the n.e. part of the United States. Its altitude is 6,293 ft.; it is e. of Crawford Notch. Granite is the

chief rock formation of the whole mass. On the e. side there are many deep gorges, and several on the n.; on the w. side the slope is steep. A United States meteorological station and a large hotel are on the summit.

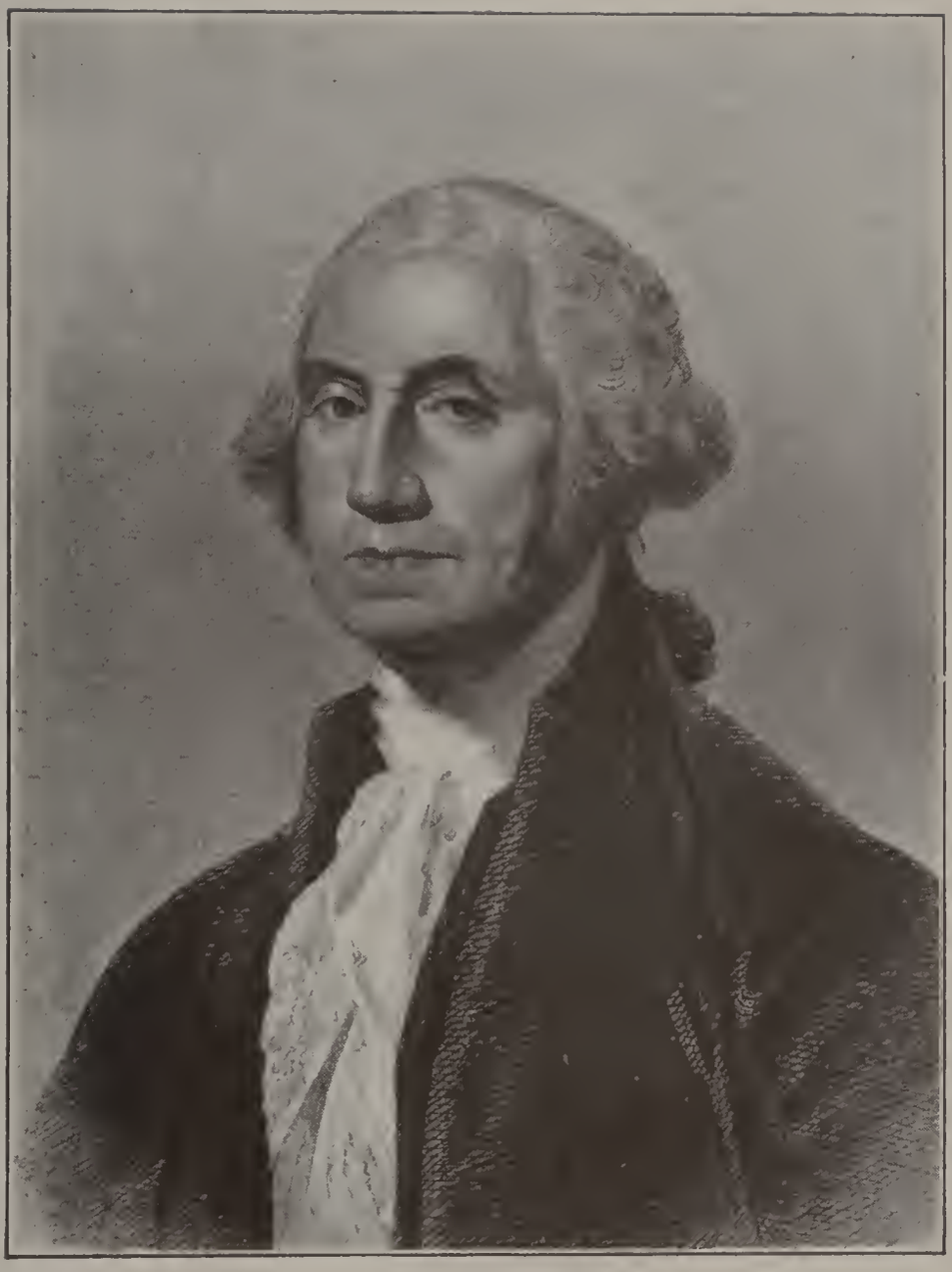
WASH'INGTON, Booker Taliaferro, A.M., LL.D.: educator; b. Hale's Ford, Va., 1856, Apr. 18. He is of African descent, and was born a slave. With much difficulty and hard work he saved enough to take him through Hampton Institute, graduating 1875, and entering Wayland Seminary the same year. Before completing his course at Wayland, he was elected a teacher at Hampton. In 1881 Washington was made president of the Tuskegee (Ala.) Institute. Under his management this school has grown from 1 teacher and 30 students to 120 teachers and more than 1,500 students and 600 graduates. His books include *Sowing and Reaping* (1900); *Up from Slavery* (1901); *Future of the American Negro* (1902); *Character Building* (1902); *Story of My Life and Work* (1903); *Working with Hands* (1904); *Tuskegee and its People* (1905); *Putting the Most Into Life* (1906); *Life of Frederick Douglas* (1907); *The Negro in Business* (1907); etc.

WASHINGTON, Bushrod, LL.D.: jurist; 1762, June 5—1829, Nov. 26; b. Westmoreland co., Va.; son of John Augustine Washington, who was brother of Gen. George Washington. Having graduated at William and Mary College 1778, he studied law and began practice in Westmoreland co. Before completing his law studies he entered the military service as a private soldier. He was member of the Virginia house of delegates 1787, and of the Virginia convention that ratified the federal constitution 1788. He became associate justice of the U. S. supreme court 1798. Washington was the first president of the Colonization Society. After the death of the widow of Gen. George Washington, Bushrod Washington, the general's favorite nephew, came into possession of the Mt. Vernon mansion, with 400 acres of land.—He published *Reports of Cases argued and determined in the Court of Appeals of Va.* (2 vols., 1792-9); *Reports of Cases determined in the Circuit Court of the United States for the 3d Circuit* (4 vols. 1826-29).

WASH'INGTON, George: first President of the United States: 1732, Feb. 22—1799, Dec. 14; b. Pope's Creek, Westmoreland co., Va.; descendant of John Washington, native of England, who emigrated to Virginia 1657, and who was an extensive planter and a county magistrate, residing at Bridge's Creek. In honor of John Washington, the parish of his residence got the name Washington. George Washington's father, Augustine Washington (d. 1743), was grandson of John Washington; George Washington's mother, Mary Ball, was second wife of Augustine Washington; she was left a widow 1743, when Washington was 12 years old; he was

the eldest of the 5 surviving children of the second marriage. The family then lived on an estate on the n. bank of the Rappahannock, nearly opposite Fredericksburg. Mary (Ball) Washington died 1789, the year of Washington's installation as first president of the United States.

Washington's school education was meagre but substantial, comprising the elements—reading, writing, arithmetic, and so much of mathematics as was requisite for a land-surveyor. When he was 14 years old, his oldest half-brother, Capt. Lawrence Washington, procured for him a midshipman's commission in the royal navy; but his mother opposed his entering the naval service, and Washington continued his studies at the home of Lawrence, Mt. Vernon, on the Potomac. He began to practice as a surveyor, and at 16 years of age was employed by Lord Fairfax as surveyor of his vast estates in Virginia. Thus he passed 3 years on the n.w. frontier of Virginia, leading the life of a pioneer in a region peopled (if peopled at all) only by the aboriginals: the mountains and valleys amid which he lived then were shortly afterward the theatre of the French and Indian war, in which Washington rendered his first military service. When trouble with the Indians and French seemed imminent, 1751, Washington, then 19 years old, was appointed adjutant of the Virginia forces, with the rank of major. His brother Lawrence died 1752, leaving a large fortune to an infant daughter, including Mt. Vernon, who did not long survive, and Washington succeeded to the estate. Gov. Dinwiddie, on arriving in Virginia, reorganized the military establishment of the province, dividing it into 4 districts, of which one was put under the command of Washington. He went as special envoy from Gov. Dinwiddie, 1753, to remonstrate with the French commandant on the Monongahela against the efforts of the French and Indians to break up the settlements of the Ohio county of Virginia in the w.: his report to the governor of Virginia showed that the French were fixed in the determination to check the westward movement of the English colonists. Measures were therefore taken by Dinwiddie to prepare for the inevitable struggle. A battalion of 300 men was raised to assert the rights of the colonists in the w. territory. Washington declined the chief command, but became lieutenant-colonel under Col. Joshua Fry. While on the march to the Ohio river the battalion halted at Will's Creek, Md., and intelligence was received there that a party previously sent forward to erect a fort at the confluence of the Monongahela and Allegheny rivers had been routed by French and Indians (1754, Apr. 7). This was the first act in the French and Indian war, which lasted 9 years. Washington with 150 men was ordered to advance on the fort which the French had constructed there, Fort Duquesne; but his force was



WASHINGTON.

totally inadequate; and promised reinforcements failing, he did not attack the place. Through the death of Fry, Washington now became chief commander. He repulsed the attack of a far superior force, French and Indian; and intrenched himself at Fort Necessity in the Great Meadows. Here he was compelled to capitulate to the French (1754, July 4), surrendering his artillery. He was permitted to return with his command to Virginia. Washington resigned his commission the next year, and retired to his estate of Mt. Vernon. The following spring, 1755, a new campaign was organized against the French on the Ohio. The nucleus of the expeditionary force was two regiments of British regulars, and the commander-in-chief was Gen. Edward Braddock. Washington was chosen by Braddock as aide-de-camp. The campaign ended in disaster. The commander and all the chief officers were killed—Washington saving the remnant of the army (1775, July 9). The Virginia assembly now ordered the raising of a regiment for defense, and named Washington chief commander. Washington tried to win the co-operation of Gen. Lord Loudon, commander of all the royal forces in America, for an active campaign against the French and Indians; he tried also to obtain aid from the governors of Pennsylvania, Maryland and North Carolina. But no assistance was rendered; and on Washington, in command of an absurdly small force, was devolved the defense of a frontier-line of 400 m. The next year, however, a small British force, supported by a Virginia battalion under Washington's command, made an expedition to Fort Duquesne; and Washington, who led the advance, took possession of the ruins of the fort (1758, Nov. 25), which had been abandoned by the enemy: Fort Duquesne now was called Fort Pitt, and there Washington left as garrison 200 of his Virginians. Returning to Virginia, Washington resigned his commission and took his seat in the Virginia assembly, of which he had been elected member. He married, 1759, Jan. 17, Martha (Dandridge) Custis, a wealthy young widow; and during the succeeding 15 years lived on his Mt. Vernon estate, managing its affairs with the exact methods of a man of business. He continued a member of the assembly, attending its sessions in the winter.

The discontent of the colonies with the methods of the British government was becoming more and more pronounced, and at the instance of Virginia a conference of representatives of all the colonies was called, to be held in Philadelphia 1774, Sept. 5. Washington was a delegate to this congress, which recommended the assembling of another congress in the following spring. But before the second congress came together blood had been shed in collisions between colonists and the royal troops at Concord and at Lexington, Mass. The congress met 1775, May 10, and chose Washington com-

mander-in-chief of the military forces of all the colonies. Washington accepted the commission, but declined all money compensation, stipulating only that moneys actually expended by him should be refunded. In nominating Washington, John Adams spoke of him as 'a gentleman whose skill and experience as an officer, whose independent fortune, great talents and excellent universal character, would command the approbation of all America, and unite the cordial exertions of all the colonies better than any other person in the Union.' It ought to be added, that when Washington heard this eulogy he modestly left the room. A year later Washington wrote: 'When I took command of the army, I abhorred the idea of independence, but I am now fully satisfied that nothing else will save us.' His history from that day till the end of the war is the history of the United States for that period. From Philadelphia, where the congress sat (of which Washington was a member), he repaired forthwith to Boston, and made his headquarters in the house long occupied by the poet Longfellow at Cambridge. The forces in the vicinity of Boston which congress had adopted numbered 17,000 men, of whom 14,500 were reported as fit for duty—raw levies, ill armed, ill clad, ill provided in every way. Washington was, in fact, disgusted by their appearance, shocked by their 'free and easy insolence' and 'loose discipline,' and he thought the officers 'the most indifferent kind of people' he had ever seen; but these first impressions wore off, as he became acquainted with the army, and he wrote to congress that the army was 'active, zealous in the cause, and of unquestionable courage.' But Washington laid siege to Boston with this army, and the British troops evacuated the town 1776, Mar. 17, sailing for Halifax. A portion of the army around Boston was now ordered to New York, and by August Washington had gathered a force of 20,000 men, including sick, furloughed, etc., with which to confront the British force of 24,000 regulars, backed by a fleet. The American army was defeated in the battle of Long Island, and Washington made a skilful retreat toward Philadelphia, through New Jersey. His movements on the Delaware were pronounced by Frederick the Great 'the most brilliant achievements recorded in military annals.' It is simple truth to say that to the indomitable spirit of Washington is in large measure due the fortitude and constancy of the army in enduring hardship at Monmouth, Brandywine, and Valley Forge. The victory at Yorktown 1781, Oct. 19, was the last great act of his military career. After peace had been established, Washington appearing in person before congress, assembled at Annapolis, Md., gave back (1783, Dec. 23) into the hands of the representatives of the people the commission by which they had appointed him commander-in-chief 1775, June 19. 'Having now finished,' said he,

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'the work assigned me, I retire from the great theatre of action; and bidding an affectionate farewell to this august body, under whose orders I have long acted, I here offer my commission, and take my leave of all the employments of public life.'

Washington then turned his face toward Mt. Vernon, purposing, there is no doubt, there to resume the duties of a private citizen and a planter. He owned much land in the country now comprised within the limits of West Virginia, Ohio, and Pennsylvania; and soon after his return home in 1784 made a tour of nearly 700 m. on horseback, through the unbroken wilderness, to visit his possessions on the Kanawha and the Ohio. But Washington was needed in the counsels of the country, and he found himself constrained to re-enter public life. The original constitution of the United States, known as the Articles of Confederation, was found to be a weak and inefficient bond of union. The several units of the confederation were jealous of each other: what one wanted another would on no account tolerate; congress was a legislative body only in name: its acts were little better than waste paper. Washington was painfully conscious of this fatal weakness of the central government. He wrote: 'We are either a united people under one head and for federal purposes, or we are 13 independent sovereignties eternally counteracting each other. Shay's rebellion in Massachusetts caused him great disquiet, as showing the inevitable outcome of the governmental anarchy. Henry Lee recommended the employment of 'influence' to check such risings, but Washington wrote, 'influence is no government,' and government was what he thought necessary. He wrote to Madison, 1786, Nov. 6: 'No morn ever dawned more favorably than ours did, and no day was ever more clouded than the present. . . . We are fast verging to anarchy and confusion.' The stern necessity of the time overcame his reluctance to enter public life once more; and he consented to be one of the delegates from Virginia to the convention in Philadelphia 1787, May 14, to form a new constitution. In the convention his voice was for whatever provisions might tend to consolidate the Union, 'in which is involved our felicity, safety, and perhaps our national existence.' The country looked to Washington as the only man to take the helm as first president, when the constitution was adopted, and though he protested, called himself 'an old man' unfitted for civil office, he was elected under the constitution, 1789, Apr. 6. He set out from Mt. Vernon for New York, then the seat of government, Apr. 16, 'reluctant,' as he said, 'in the evening of life to exchange a peaceful abode for an ocean of difficulties.' On the way he was received with fitting honor and respect in every town through which his route lay. Apr. 30, on a portico in front of the hall then used as a temporary abode of congress, he swore to 'preserve, protect and

defend the constitution of the United States.' Chancellor Livingston cried to the people, 'Long live George Washington, President of the United States!' The people shouted in response, cannons boomed, and a new chapter in national life was begun. The U. S. sub-treasury building in Wall st. now occupies the site, and the momentous event is commemorated by a bronze statue of Washington erected above the spot where the ceremony took place.

Again Washington's history is the history of his country. In the presidential office he was a peacemaker between conflicting tendencies, warring factions, and irreconcilable interests. A contemporary observer, William Maclay, senator from Pennsylvania in the first congress under the new constitution, wrote: 'The president's amiable deportment smooths and sweetens everything.' And the French minister Moustier, writing to his official superiors, said, a few weeks after Washington had assumed the duties of office: 'The opinion of Gen. Washington was of such weight that it alone contributed more than any other measure to cause the present constitution to be adopted. The extreme confidence in his patriotism, his integrity, and his intelligence, forms to-day its principal support.' He adds: 'All is hushed in presence of the trust of the people in the savior of the country.' The same perplexity that has worried his successors in the presidency beset Washington: he experienced the annoyance attending the distribution of government places. A few weeks after induction into office he writes: 'No part of my duty will be more delicate, and in many instances more displeasing, than that of nominating and appointing persons to office. . . . I shall, however, in all events, have the satisfaction to reflect that I entered upon my administration unconfined by a single engagement, uninfluenced by any ties of blood or friendship, and with the best and fullest determination to nominate to office those persons only who . . . were the most deserving, and who would probably execute their functions to the interest and credit of the American Union.' He named as secretary of state Thomas Jefferson, whose political principles were those of the opposite school from his own; his secretary of the treasury, Alexander Hamilton, was more in sympathy with his own views and his own interpretation of the constitution. The naming of Jefferson, then 46 years of age, and the eldest member of the cabinet, was patent proof that Washington's purpose was to administer the government purely for the good of the whole people and not in the interest of a political party or faction. The love of the people for 'the father of his country' was strikingly shown when, in the first summer of his official life, he made a tour through the e. states for his health, which had been impaired by a serious illness of some weeks. Everywhere the popular enthusiasm was unbounded; and it was

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genuine and spontaneous. The people held him in veneration as a character raised high above the meannesses of the common level of man's life; and it is no wonder that after his death he received the glorification by which good and great men, who have shown their qualities in days of fearful crisis, become idealized in the popular mind, and are portrayed by fond chroniclers as more than human. Thus did a plentiful crop of myth spring up around the name of Washington even while he lived; after his death it still grew, till historic criticism was fain to use the scythe perhaps ruthlessly.

In Washington's two administrations there was in the United States no openly recognized division of parties; but two parties existed nevertheless: the party of centralization, of liberal constitutional construction, and (as their opponents maintained) of monarchical or aristocratic tendency. Alexander Hamilton represented that party or school in the cabinet: with him Washington was, as already said, on the whole in sympathy. Washington had felt deeply the evils of disunion, which had well nigh caused even him to 'despair of the state': thus there was good reason for him to favor such construction of the constitution as would lead to repression of the evils. Jefferson represented the other party or school, that of state right and strict interpretation of the federal constitution, so as to reduce to minimum the power of the central government. When Washington's first term of the presidency was nearing its end, he desired to go back to his estate. But Jefferson wrote him: 'The confidence of the whole country is centered in you. . . . North and South will hang together if they have you to hang on'—impressive testimony from a keen political opponent (for such was Jefferson). Hamilton wrote to exactly the same effect: 'It is clear that if you continue in office nothing materially mischievous is to be apprehended; if you quit, much is to be dreaded.' So, having been chosen by unanimous vote of the electors, Washington entered on the duties of a second term 1793, Mar. 4. His first act awakened the slumbering partizanships. France, having declared war against England and Holland, expected aid, covert at least, from America. But President Washington issued, Apr. 22, a proclamation of neutrality. In this act he was supported by Hamilton and by the whole school of centralizers (including all well affected toward England and ill affected toward France and French ideas); but was opposed by the state-right faction (including the friends of France and of universal republican liberty). Before long the two schools stood confessed as political parties, one (with Washington) called federal, the other (with Jefferson) republican. A treaty with England, negotiated by John Jay, further stimulated party division in 1796, on the return of Jay. A federal tax on whisky was the cause of much dissatisfaction, and 1794 there was a 'whisky re-

bellion' in w. Pennsylvania, which the president set out to suppress in person with a military force; but the revolt subsided on the intelligence of his approach, and Washington was saved the necessity of taking up arms against fellow-citizens. The dismissal of Genet, French minister to the United States, also was made matter of recrimination between partizans.

Washington at the end of his second term went to Mt. Vernon, there, as he hoped, to spend the remainder of his life. He bade farewell to congress and his countrymen in an address published several months before his actual retirement, 1796, Sept. 19. But congress having, in the prospect of a war with France, authorized the levy of an armed force, President Adams, in sympathy with the universal popular sentiment, called Washington again into the service of the country. 'We must have your name,' he wrote to Washington, 'if you will permit us to use it. There will be more efficacy in it than in many an army.' So Washington was, 1798, July 3, commissioned 'lieutenant-general and commander-in-chief of all the armies raised or to be raised in the United States,' and at once set about the work of organization. War with France was averted, but before that happy consummation Washington died. The immediate cause of death was lung congestion, brought on by exposure to a rain-storm while riding over his estate with his stewards. The date of death was 1799, Dec. 14, between 10 and 11 o'clock at night. The funeral ceremony was severely simple. His body was laid in a vault at Mt. Vernon Dec. 18, with Masonic rites, in presence of a small gathering of neighbors and a few soldiers. His eulogy was pronounced in congress by Representative John Marshall, of Virginia, afterward chief-justice of the U. S. supreme court. The resolutions expressing the mind of the national legislature on the death of Washington were drafted by Richard Henry Lee, and concluded with declaring that the deceased had been 'first in war, first in peace, and first in the hearts of his fellow-citizens': afterward Gen. Lee, in his panegyric of Washington, changed the last words 'fellow citizens' to 'countrymen.' By resolution of congress the next succeeding anniversary of Washington's birth, Feb. 22, was commended to the whole people as a day to be devoted to commemoration of the deceased 'father of his country.'

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WASHINGTON, Martha (Dandridge): wife of Gen. George Washington: 1732, May—1802, May 22; b. New Kent co., Va.; daughter of Col. John Dandridge. She received a good education at home; married Daniel Parke Custis 1749, who died 1757. Two children survived the father—viz., a daughter who died at the age of 17, and a son, John Parke Custis. The widow was married to Gen. George Washington 1759. She was with Washington at Cambridge 1775; she shared with the army the hardships of Valley Forge. During the war she would wear none but home-made fabrics for clothing. Her children by her former husband were adopted by Gen. Washington. She had strong dislike for public life and rejoiced when Gen. Washington refused the offer of the presidency tendered to him the third time. Before her death she burned all her correspondence with Gen. Washington.

WASHINGTON, William: soldier: 1752, Feb. 28—1810, Mar. 6; b. Stafford co., Va.; son of Bailey Washington, kinsman of Gen. George Washington. At the beginning of the war of the revolution he was commissioned captain of a Virginia infantry regiment, and served with the army around New York; was severely wounded in the battle of Long Island, yet at Trenton, 1776, Dec. 26, gallantly led a charge on an English battery, which he captured, but was again wounded. He was transferred to a cavalry regiment 1778; served in the south in the army of Gen. Benjamin Lincoln 1779; while lieutenant-colonel commanding his regiment he defeated an English force under Lieut.-col. Banastre Tarleton. He earned high distinction in the battle of Cowpens, where he had a personal encounter with Tarleton; and also at Guilford Court House, N. C., Hobkirk's Hill, and Eutaw Springs: in the latter battle he was again wounded and was taken prisoner. He became a citizen of Charleston, S. C., after the war, and served in the state legislature.

WASHINGTON AGRICULTURAL COLLEGE AND SCHOOL OF SCIENCE (name changed to 'The State College of Washington'): located at Pullman, Washington. It was founded in 1890 and is coeducational. The courses are divided into the following departments: (1) Department of mathematics and civil engineering; (2) Department of chemistry; (3) Department of botany and zoölogy: (4) Department of agriculture; (5) Department of horticulture; (6) Department of English language and literature; (7) Department of economic science and history; (8) the department of mechanical engineering, including electrical engineering; (9) Department of modern languages; (10) Department of mining engineering; (11) Department of geology; (12) Department of military science and tactics. There are also supplementary courses in physics, Latin, domestic economy and education, and the following special

schools: the preparatory school, the school of agriculture, the school of dairying, the school of pharmacy, the school of veterinary science, the school of business and the school for artisans. The buildings include the administration building, science hall, college hall, mechanical hall, Ferry hall, Stevens hall, the mining building, Morrill hall (for the department of chemistry), the gymnasium and armory, the veterinary hospital, the greenhouse, the farm and dairy buildings. An infirmary was built in 1904. The scientific laboratories are well equipped with modern apparatus; the library contains 10,000 volumes, in addition to which the experiment station library is open to students. The students number 1,079, the faculty 80.

WASHINGTON COLLEGE: located at Chestertown, Md. It was chartered as a college in 1782, being the oldest institution of collegiate grade in the state. The college is non-sectarian, and receives an appropriation from the state. It is open to women. The college offers two collegiate courses, classical and scientific, each leading to the degree of A. B., a normal course, and a preparatory course of three years. There are no electives in the collegiate courses. The buildings include the main building, normal hall (a dormitory for women, built by the state), and the gymnasium. The library contains 5,000 volumes; the students number 145, and the faculty 11.

WASHINGTON COLLEGE: located in Washington co., Tenn. It was chartered as an academy in 1783, and as a college in 1795. Two-thirds of the board of trustees must be Presbyterians, but the college is not otherwise under denominational control. Two college courses are offered, the classical leading to the degree of A.B., and the scientific leading to the degree of B.S. There are also courses in music and oratory, a preparatory department with an auxiliary department giving instruction in domestic science, and an industrial department (established in 1892-3). The buildings are the recitation hall, the boys' dormitory, and the girls' dormitory. Salem Church is used as the college chapel. The students number 210, and the faculty 12.

WASHINGTON AND JEFFERSON COLLEGE: located at Washington, Pa.; founded in 1865 by the union of Washington Academy at Washington and Jefferson College, at Canonsburg. The control is vested in a self-perpetuating board of trustees of 31 members. The college offers three courses leading to degrees, the classical (with the degree of A.B.), the Latin scientific (degree of B.S.), and the French scientific (degree of B.S.). There are also a course in civil engineering and a preparatory department. The college occupies 16 acres within the limits of the town; a new library building, the latest addition to its equipment, was erected in

1903-4. The property and endowment of the college, including amounts pledged at the centennial celebration of 1902, amounted in 1906 to between $900,000 and $1,000,000. The students number 390, and the faculty 31.

WASHINGTON AND LEE UNIVERSITY: institution of learning at Lexington, Va. The legislature of Virginia granted a charter (1782) to the Liberty Hall Academy, a school that had been in existence from 1749, and which, till the beginning of the revolution, had been named 'Augusta Academy.' To Liberty Hall Academy, George Washington gave 100 shares of the stock of the James River Canal Company, 1796, which the legislature purchased from the trustees, giving in return interest-bearing state bonds to the amount of $50,000: the institution then became 'Washington College.' The Society of the Cincinnati endowed Washington College (1803) with a fund of $25,000; and large bequests were made to it at sundry times till 1870, when, on the death of Gen. Robert E. Lee, the name was changed to Washington and Lee University. The government of the institution is in the hands of trustees. The Washington College was closed during the civil war, and its property was wasted and its buildings dilapidated; but the university has more than repaired the damages and losses. Gen. Robert E. Lee was president of the institution from 1865 till his death, 1870; then his son, Gen. George Washington Custis Lee, succeeded to the presidency. The university organization includes three schools: (1) the School of Arts; (2) the School of Engineering; (3) the School of Law. In the School of Arts the degree of A.B. is conferred. The degrees of A.M. and PH.D. are conferred for graduate work. The School of Engineering confers the degree of B.S. The degree of LL.B. is conferred by the School of Law for a two years' course. The buildings include the main building; the Lee chapel, in the crypt of which Gen. Lee is buried; Newcomb Hall (the library); Tucker Hall (the law building); the chemical laboratory; the gymnasium; engineering hall, and two dormitories, one of which was completed in 1904. The library contains about 50,000 volumes, including the law library. The students number 400, and the faculty 31.

WASHINGTON UNIVERSITY: institution of learning in St. Louis, Mo., incorporated 1853. It is a state institution comprising several departments—viz., an Academy, Mary Institute, College; O'Fallon Polytechnic Institute, and a Law School. The Mary Institute is a school of liberal arts for girls. The O'Fallon Polytechnic Institute has five different courses in applied science—viz., civil engineering, mechanical engineering, chemistry, mining and metallurgy, and building and architecture: each of these courses occupies four years. The Academy is a high school for boys. The university also conducts

a manual-training school. The college confers the degree of A.B.; the engineering department confers the degree of B.S. For graduate work the university confers the degrees of A.M., M.S., PH.D., and the professional degrees of civil, mechanical, electrical and chemical engineer after not less than three years of successful active practice. The productive funds of the university amount to $5,544,000; the library contains 57,000 volumes; the students number 1,834, and the faculty 235.

WASHINGTON, UNIVERSITY OF: the state university located at Seattle, Wash., opened in 1862. It is open to all without charge for tuition, except in the School of Law. The board of regents consists of 7 members, appointed by the governor with the approval of the Senate, for a term of six years. The university includes the following schools: (1) the College of Liberal Arts; (2) the College of Engineering; (3) the School of Mines; (4) the School of Pharmacy; (5) the School of Law. The College of Liberal Arts offers a classical, a literary, and a scientific course, all leading to the degree of A.B. In each course half the work is elective. The degree of A.M. is conferred for graduate work. The College of Engineering confers the degree of B.S., and the degrees of C.E., E.E., and M.E. for graduate work. The School of Mines offers two courses leading to the degree of B.S. Graduate work is offered which leads to the degree of E.M. (engineer of mines). The School of Pharmacy has a two years' course leading to the degree of graduate in pharmacy, and an advanced four years' course with the degree of B.S. The School of Law provides a two years' course which leads to the degree of LL.B., and admits to the state bar without further examination. The university grounds comprise 355 acres lying between Lakes Union and Washington. The buildings include the Administration Building, Science Hall, the observatory, the assay shop, two dormitories and the gymnasium. The library contains 23,155 volumes; the students number 1,394, and the faculty 74. In 1854 congress appropriated two townships to establish the university; in 1855 the legislature organized the Territorial University of Washington in two equal institutions, one at Seattle, the other on Boisfort Plains, Lewis co.; but as no further steps were taken toward the establishing of the university, the legislature united the two institutions and fixed the location in Cowlitz, Farm Prairie, Lewis co. This shifting policy led the people of the Puget Sound region to incorporate another university, and the fear of thus duplicating institutions led the legislature to definitely fix the location of the University of Washington at Seattle. In its earlier years the university met with many difficulties, chiefly financial, as the Territory appropriated no money for its maintenance until 1879; its progress was slow until 1893, when the legislature provided a new site and appropriation for building purposes.

WASHITA, *wŏsh-ē-taw'*, River: rising on the w. border of Ark., flowing e. and s e. through La., emptying into the Red river, 30 m. from its mouth; it is 500 m. long, and is navigable to Camden, 300 m. Its chief branches are the Saline river, La Fourche, Tensas, and Little Missouri.

WASP, n. *wŏsp* [AS. *wæps;* Ger. *wespe;* OHG. *wafsa;* L. *vespa*, a wasp: Lith. *wapsa*, a gadfly]: an active, stinging, winged insect, resembling a bee. Wasp'ish, a. *-ĭsh*, resembling a wasp; quick to resent a trifling affront; snappish; irritable; slender in the waist, as a wasp. Wasp'ishly, ad. *-lĭ*. Wasp'ishness, n. *-nĕs*, the state or quality of being waspish; irascibility; snappishness. Waspish-headed, in *OE.*, petulant. Wasp fly, a striped fly resembling a wasp, but stingless.—Syn. of 'waspish': petulant; irascible; peevish; captious.

WASP: any species of the family *Vespariæ* and allied families, of the order *Hymenoptera.* They are distinguished from all the other *Hymenoptera* by their wings, when at rest, being folded throughout their entire length. The body is naked or slightly hairy. The general appearance sometimes resembles that of bees. The division between the thorax and abdomen is very deep, the abdomen often stalked. The legs are not fitted for collecting pollen, like those of bees. The females and neuters have stings, generally more formidable than those of bees. Wasps differ very widely in their habits; some being solitary, the family *Eumenidæ* of some entomologists; others social, to which the name *Vespidæ* is sometimes restricted. Neuters are found only among the social wasps. Some of the solitary wasps make curious burrows in sand, or construct tubes of earthy paste on the sides of walls, in which they form cells for their eggs, at the same time placing there a store of food for the larvæ, some of them using for this purpose perfect insects, others caterpillars, which are stung so as not to be killed, yet rendered incapable of motion. Others make little earthen cells on the stems of plants, and store in them a little honey for their young. The social wasps have various modes of constructing their nests, which are sometimes formed in excavations in the ground, sometimes attached to walls, boughs of trees, etc., and made of a paper-like substance, produced by mixing into a pulp, with their saliva, small particles of woody fibre, torn from trees, etc., by their broad and powerful mandibles. Great diversities are seen in arrangement of the combs within the nest. The combs are made of a substance similar to the outer covering of the nest, but generally thicker and firmer. As the nest is enlarged, new paper is made for the purpose, the whole nest being inclosed in the last-made envelope, and the inner ones, which sufficed for its former size, are removed to give place to combs. Several inner envelopes are generally found in a W 's nest, so that paper-making must be a great part of the industry of these insects. The nests of the wasps of tropical countries are often very large, sometimes 6 ft. long, and the communities very numerous. In colder regions the increase of the community and

of the nest is arrested by the approach of winter, when the males and the neuters die; but a few of the females survive, passing the winter in a torpid state in some retreat, and found new communities in spring. In a community of wasps there are many perfect females—not merely a single queen, as in the case of hive-bees. Wasps in their perfect state feed on a great variety of animal and vegetable substances—e.g., insects, flesh, fruit, sugar, etc. Grapes or gooseberries, especially if overripe, are often found to contain a W. in the interior. Wasps frequently invade bee-hives and steal honey. There is a Brazilian species (*Myropetera scutellaris*) which stores up honey like bees. Wasps may be killed by pouring hot water on their nests; but more easily by the vapor of burning sulphur, when the nests are not in the ground; or ether or chloroform may be used to stupefy the wasps, so that the nest may be safely destroyed.

There are about 900 known species. The genus *Vespa* is that of the Paper-wasps, though some build of other material. Our common and largest species is *V. maculata.* The yellow W. is *V. arenaria.* The Hornet (*V. crabro*) sometimes eats ripe fruit—its wages for using other insects to feed its young. *Polistes* hangs a few papery cells on bushes, with no inclosing wall. The most curious nests are the mud ones, often strung along on a currant-twig, made by *Eumenes fraterna;* they are globular, with a short neck and flaring mouth, and are pretty examples of insect pottery. There are other families often called wasps—e.g., *Crabronidæ,* the Sand-wasps and Wood-wasps—the forefeet of the females adapted to digging or tunnelling, sometimes in pith, in rotten wood, or enlarging nail-holes in posts. In the family *Sphegidæ,* some are large; such is the common gold-powdered rust-red *Sphex ichneumonea,* which digs holes in gravelly walks. In the family *Pompilidæ* there are 500 described species, often large, usually black or bluish black.

WASSAIL, or WASSEL, n. *wŏs'sĕl* [AS. salutation on pledging one to drink, *wæs-hæl*, be of health—from *wæs*, be, and *hæl*, whole or sound]: a custom formerly indulged in on Twelfth-night of going about with a great bowl of ale drinking healths; a drinking-bout; a festive occasion; any merry-making accompanied with drinking, particularly at Christmas; the liquor used on such festive occasions. WAS'SAIL, v. in *OE.,* to hold a merry drinking-meeting ADJ. convivial; festive. WAS'SAILING, imp. WAS'SAILED, pp. *-sĕld.* WAS'SAILER, n. *-ẽr,* a reveller. WASSAIL-BOWL, WASSAIL-CUP, a large bowl or cup from which wassail was drunk.

WAST, v. *wŏst* [see WAS]: 2d. person sing. of the past tense of the verb *be.*

WASTAGE: see under WASTE.

WASTE, v. *wāst* [OF. *gaster, waster,* to spoil, to render unfit for occupation: OHG. *wasten,* to lay waste; *waste,* waste, uncultivated land: Ger. *wüst,* waste, desert, desolate —all from L. *vastus,* waste, desert]: to cause or suffer to

be lost by squandering; to destroy or expend wantonly or unnecessarily; to squander; to throw away; to wear out, to consume; to damage or injure; to desolate; to lose bulk or substance gradually; to be consumed or dissipated; to lose by lack of use: ADJ. ruined; ravaged: destroyed; uncultivated; desert; desolate; rejected, or used for inferior purposes; worthless; superfluous; exuberant; overabundant: N. land untilled; a region ruined, deserted, or desolate; a space unoccupied; the act of squandering; that which is rejected; refuse cotton or silk; useless expense; among *miners*, the old neglected workings of a coal mine. WAST'ING, imp.: ADJ. diminishing by dissipation; consuming by slow degrees. WAST'ED, pp. squandered; dissipated; diminished. WAST'AGE, n. *-āj*, waste or loss. WASTE'FUL, a. *-fŭl*, expending without necessity or use; lavish; profuse; destructive; in *OE*, desolate; uncultivated; unoccupied. WASTE'FULLY, ad. *-li*. WASTE'FULNESS, n. *-nĕs*, the act or practice of expending without necessity or use; prodigality; profuseness. WASTE'NESS, n. *-nĕs*, a desolate state; solitude. WAST'ER, n. *-ẽr*, one who wastes; a 'thief' on a candle. LAID WASTE, made desolate; ruined. WASTE-BASKET, a basket or receptacle for discarded letters, papers, documents, etc.; a receptacle for waste material. WASTE-BOOK, a book in which rough entries of transactions are made; a day-book. WASTE-PAPER, spoiled paper or paper of no further use. WASTE-PIPE, a pipe for conveying away waste or superfluous water. WASTE-STEAM-PIPE, in *steam-engines*, the pipe leading from the safety-valve to the atmosphere. TO RUN TO WASTE, to become lost for any useful purpose.—SYN. of 'waste, v.': to dissipate; diminish; dwindle; desolate; squander; spend;—of 'waste, n.': prodigality; loss; diminution; destruction; dissipation; desolation; havoc; ravage; devastation; extravagance; profuseness.—*Waste*, in the law of real property, means the spoil or destruction to houses, gardens, trees, or other corporeal hereditaments, committed by tenants for life or for years, to the injury of the remainder-man or reversioner. Thus, he who has a life-estate, or an estate for years, in a house or land, cannot change the nature of things, as by turning arable into wood land or *vice versa*, though he may better a thing of the same kind, as by draining a meadow, etc. The characteristics of waste are to diminish the value of the inheritance, or to increase the burden on it, or to impair the evidence of title. Waste is either voluntary or permissive. The former consists in acts which the tenant has no authority to do—e.g., pulling down buildings, felling timber, or opening mines. Permissive waste arises from the omission of acts which it is the tenant's duty to do—e.g., suffering buildings to go to decay by wrongfully neglecting to repair them. There is, however, incident to every estate for life or years the right to take estovers—that is, so much wood, stone, etc., as is required for use on the tenement, for repairs, husbandry, and like purposes. Sometimes a tenant for life or for years holds estate under an instrument 'without impeachment for waste': the effect of this clause is to enable

the tenant to take timber, minerals, etc.; severed by himself or others during the continuance of his estate. Wherever the tenant is committing acts of a character especially destructive to the estate, or, still more, acts of wanton or malicious mischief, the court holds that his legal power to commit waste is being used unconscientiously, and will restrain him.

WASTE LANDS: uncultivated and unprofitable tracts in populous and cultivated countries. The term waste lands is not employed with reference to land not reduced to cultivation in countries only partially settled. There is a large extent of waste lands even in the British Islands. Of the 77,800,000 acres which they contain, only about 47,000,000 are arable land and improved pasture; 2,000,000 acres are occupied with woods and plantations; 7,000,000 acres in Scotland consist of sheep-pasture, generally at considerable elevation, and little improved by art; 8,000,000 acres in Ireland are uninclosed pasture, generally quite unimproved; 3,000,000 acres are mountain and bog; and the remainder is unimproved and unproductive.

In the United States, much of the land now practically waste is in this condition merely because the time has not yet come for profitable development of its capacities. A large portion of the area which 40 years ago was known as the 'Great American Desert' has been brought under cultivation and is remarkably productive. With increase of population, and multiplication of railroads, much of the land in the west now lying idle will be converted into fertile fields. Many of the 'abandoned farms' in the eastern states, some of which have been injured by a bad system of tillage, also will be reclaimed.

WASTING PALSY: Tabes Dorsalis (q.v.).

WASTREL, n. *wāst'rĕl* [prov. Eng.: dim. from Eng. *waste,* which see]: any waste thing or substance; that which may be thrown away or rejected as useless or imperfect; a term applied to a child growing up in ignorance, or being trained up to crime; a street Arab. WASTOREL, OE. for WASTREL.

WAT, n. *wât:* a Siamese term for a sacred place, within which are pagodas, monasteries, idols, tanks, etc.

WATAUGA ASSOCIATION: in American history, a name adopted by a party of settlers who established the first independent civil government in North America. In 1768, the Six Nations agreed to surrender all the lands between the Ohio and Tennessee rivers. The first settlers were largely from Virginia and the first settlement was made on the banks of the Watauga river in 1769. The Watauga Association, established in 1772 by John Sevier, James Robertson and others, subsequently grew to be the state of Tennessee. Under the title 'Articles of the Watauga Association,' a written constitution was drafted, the first ever adopted by American-born freemen.

WATCH, n. *wŏch* [AS. *wæcce*, a watch; *wacan*, to wake: Ger. *wache*, watch, look-out: Icel. *vakta*, to observe: see also WAKE]: wakefulness; attendance without sleep: close observation; steady look-out; a person or persons keeping guard; a sentinel; a guard; a watchman or watchmen; the space of time allotted to a guard to keep watch; period of time; hour, especially of the night, which among the Jews, Greeks, and Romans, was divided into three parts called the first, middle, and morning *watches*. Later there were four watches, called *even-*, *midnight*, *cock-crowing*, and *morning*, or *first watch*, *second watch*, etc.: on *shipboard*, the period of time during which one portion of the officers and crew are on duty and the other resting; these periods are seven in number and four hours in length except from 4 to 8 P.M., which is divided into two dog-watches, the object of which is to prevent the same men being always on duty at the same hours. The watches are called the *afternoon watch* (noon to 4 P.M.); *first dog-watch* (4 to 6 P.M.); *second dog-watch* (6 to 8 P.M.); *first night-watch* (8 P.M. to midnight); *middle watch* (midnight to 4 A.M.); *morning watch* (4 A.M. to 8 A.M.); and *forenoon watch* (from 8 A.M. till noon). The name is applied also to the men on duty during one of these periods, generally known as the captain's or *starboard watch*, in charge of the capt. and second officer, and the port or *larboard watch*, in charge of the first officer. Also, that by which watches are measured; a portable pocket time-piece (see below): V. to be awake; to be attentive; to look with attention or expectation; to keep guard; to attend; to lie in wait for; to observe attentively in order to detect or prevent; to be carefully observant; to attend on the sick during the night. WATCH'ING, imp; WATCHED, pp. *wŏcht*. WATCH'ER, n. *-ẽr*, one who watches. one who sits up to watch all night. WATCH'FUL, a. *-fûl*, vigilant; careful to observe; attentive. WATCH'FULLY, ad. *-li*. WATCH'FULNESS, n. *-nĕs*, vigilance; suspicious attention; careful and diligent observation: inability to sleep. WATCH-BARREL, the brass box in a watch containing the mainspring. WATCH CASE, the outside covering of a watch. WATCH-DOG, a dog kept to guard premises or property. WATCH-FIRE, a fire lighted at night as a signal, or for the use of the watch or guard. WATCH-GLASS, the glass covering the face of a watch. WATCH-GUARD, a cord or chain to attach a watch to the person. WATCH-LIGHT, *formerly*, a candle with a rush wick to burn in the night. WATCH'MAKER, one who constructs timepieces for the pocket. WATCH'MAN, n. one who guards the streets of a city, town, or large building by night or by day; a sentinel. WATCH-TOWER, a tower on which a sentinel is placed to watch the approach of enemies. WATCH'WORD, n. a word or phrase given to sentinels, used as a signal to distinguish a friend from an enemy, or one who has a right to pass the guard; a pass-word; a principle of action. ANCHOR WATCH, one or two men detailed to look after a ship while at anchor. BLACK WATCH, the 42d regiment of Highlanders, so named from the dark color of their tartan. DOG-WATCHES, two short watches on board ship between 4 and 8 P.M. TO KEEP WATCH AND WARD, to watch by night

and defend by day; hence to be vigilant night and day; to guard carefully.—Syn. of 'watchful': wakeful; cautious; observant; circumspect; heedful.

WATCH: small portable timepiece, which can be carried in any position without stopping. In construction the W. differs from a clock chiefly in obtaining its moving power from the elastic force of a coiled spring instead of from a weight, the movement being regulated, so as to be isochronous, by a Balance (q.v.) and balance spring instead of a pendulum: see Horology. The going part of a watch consists of a train of wheels and pinions, kept in motion by a spring, called the mainspring; the last and fastest wheel of the train, the scape-wheel or balance-wheel, acting so as to keep in vibratory motion a balance whose movement again—which is made isochronous by the action of another spring called the balance-spring—regulates to a uniform rate the revolution of the scape-wheel, and consequently the motion of the rest of the train, and the uncoiling of the mainspring.

The mainspring is a thin ribbon of steel coiled in a barrel. The inner end of it is fixed to a strong spindle, the axis or *arbor* of the barrel, around which it is coiled, and the outer end is fixed to the inside of the barrel. By its tendency to uncoil itself, the spring sets the barrel in motion, and it produces as many revolutions of the barrel as it makes turns itself in unwinding (fig. 1). As its elastic force is greater when it is tightly coiled than when it has to some extent unwound itself, a piece of machinery, called a fusee, is sometimes employed to correct the variations in the force of the spring, and equalize the power exerted on the train. The fusee is a cone with a spiral groove, connected with the barrel which contains the mainspring by a chain, one end of which is fixed at the broadest part of the cone, and the other end to the barrel (fig. 2). The barrel moves the fusee by means of the chain, which, as it runs off the sides of the fusee, is

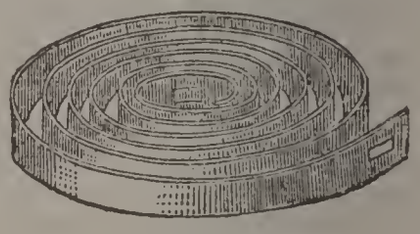


Fig. 1.

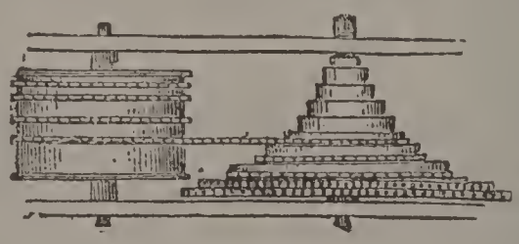


Fig. 2.

coiled on the outside of the barrel. In winding a watch the key is placed on the axis of the fusee, and by the same movement the mainspring is coiled around its spindle, and the chain wound off the barrel, to cover the cone of the fusee. So when the spring is all coiled up, and its force on the barrel is greatest, the chain is acting at the small

end of the fusee, and its leverage on the fusee is least; as the force of the spring diminishes, the chain having come to a broader part of the fusee, the leverage is increased; and the grooving of the fusee being, when perfect, arranged so that a section of the fusee along its axis would present two hyperbolas placed back to back, secures that the force of the spring, modified by the leverage of the chain, shall produce a uniform motion of the fusee. From the fusee this motion is communicated to the watch-train, the first wheel of the train—called the fusee-wheel or the great wheel—being set upon the fusee. The fusee is introduced in almost all English-made watches; but a great proportion of watches made in the United States and Switzerland, and most French spring clocks, being made without fusee, have consequently no chain, and have the great wheel fixed on to the barrel. Accurate time-keeping was not formerly expected from such clocks or watches; but by skilful contrivance and careful construction in recent years, main-springs are now made to possess constancy of motion through the whole time of unwinding.

Between the train of wheels and pinions in a watch and that of a clock, until we come to the escapement, there is no difference, except that there is one more wheel and pinion in the watch-train than in the clock-train; the reason of which is, that the scape-wheel of a watch revolves, not like that of a clock, in a minute, but usually in about six seconds, making necessary an additional wheel to revolve in a minute and carry the seconds hand. A great variety of watch escapements are in use. The oldest is the vertical escapement. It corresponds exactly to the crown-wheel escapement in clocks (see HOROLOGY). The accompanying figure, showing a watch-train with this escapement, is useful as indicating, in a general way, the arrangement of the wheel-work in a watch (fig. 3). The mainspring contained in the barrel B sets in motion the

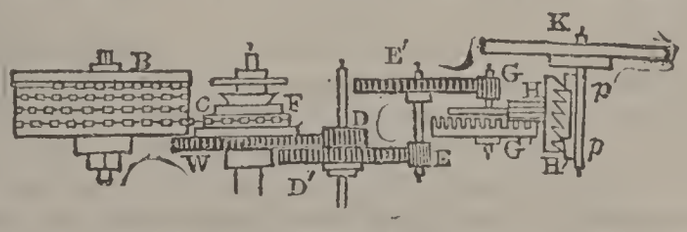


Fig. 3.

barrel, which, by means of the chain *c*, moves at a uniform rate the fusee F, together with which turns the fusee-wheel W, the first or great wheel of the watch-train. It is evident how, from the great wheel, motion is communicated successively to the centre-pinion D, and the centre-wheel D′ (which turn in an hour); to the third-wheel pinion, E, and the third wheel, which is upon the same arbor, E′; and to the fourth or contrate-wheel pinion G, and the contrate-wheel G′. The upright teeth of the last-named wheel move the balance-wheel pinion H, and with it the balance-wheel or scape-wheel H′, which is fixed upon its arbor. The scape-wheel (and in this escapement the contrate-wheel also) is what is called, from its shape, a crown-

wheel. Upon the arbor or verge of the balance K are two pallets, *p*, *p*, at a distance from each other equal to the diameter of the scape-wheel, and so placed that, as the scape-wheel revolves, its teeth give them alternately an impulse in different directions, which keeps up the vibratory motion of the balance. The fusee is now not used on ordinary watches, the breaking of the chain and additional complications rendering it objectionable. The balance is made to vibrate isochronously by the action of the balance-spring; and its vibration regulates the escape of the teeth of the scape-wheel, and so the motion of the whole train, exactly as that of the pendulum does in an ordinary clock. The vertical escapement is liable, though in less degree, to the same objection as the old crown-wheel and the crutch or anchor escapements in clocks: there is a recoil of the scape-wheel after one of its teeth has been stopped by a pallet, which interferes more or less with the accuracy and uniformity of the motion of the train: see HOROLOGY.

Almost immediately after the invention of the balance-spring, attempts began to be made to introduce an escapement which would produce greater accuracy than the vertical escapement. Hooke, Huygens, Hautefeuille, and Tompion introduced new principles, each of which has since been successfully applied, though they all, from imperfect execution, failed at the time. The first real improvement was made by George Graham, inventor of the dead escapement in clocks (fig. 4). This is called the horizontal escapement; it was introduced in the beginning of the 18th c., and it is still the escapement used in very many watches. The impulse is given to a hollow cut in the cylindrical axis of the balance, by teeth of a peculiar form projecting from a horizontal crown-wheel. Other forms of escapement in high estimation are the lever escapement, invented by Berthoud, improved by Mudge; the duplex escapement, the principle invented by Hooke, the construction perfected by Tyrer; and the detached escapement of Berthoud, improved by Arnold and Earnshaw. The last-mentioned is employed in marine chronometers and in pocket-chronometers, as watches made in all respects like chronometers are called. The lever escapement is used in most English-made watches. In it the scape-wheel and pallets are exactly the same as in the dead escapement in clocks: see HOROLOGY. The pallets, *p*, *p* (fig. 5), are set on a lever which turns on their arbor, A; and there is a pin, B, in a small disk on the verge or arbor of the balance, which works into a notch at the end of the lever. The pin and notch are so adjusted, that when a tooth of the scape-wheel has become free, the pin slips out of the notch, and the balance is detached from the lever during the remainder of its swing; whence

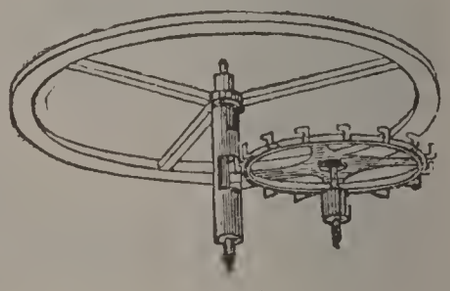


Fig. 4.

the name *detached* lever escapement, originally applied to this arrangement. On the balance returning, the pin again enters the notch, moving the lever just enough to send the tooth next in order to escape from the dead face of the pallet on to the impulse face; then the scape-wheel acts on the lever and balance; the tooth escapes, and another tooth drops on the dead face of the pallet, the pin at the same time passing out of the notch in the other direction, leaving the balance again free. This arrangement is found to give great accuracy and steadiness of performance. To prevent the teeth from slipping away while the balance is free, the faces of the pallets are slightly undercut, and this makes them secure while at rest; moreover, there is a pin on the lever which moves through a notch on the balance disk, while the pin, B, moves through the notch in the lever, which is so adjusted as to guard against the lever moving and the teeth escaping, while the balance is free.

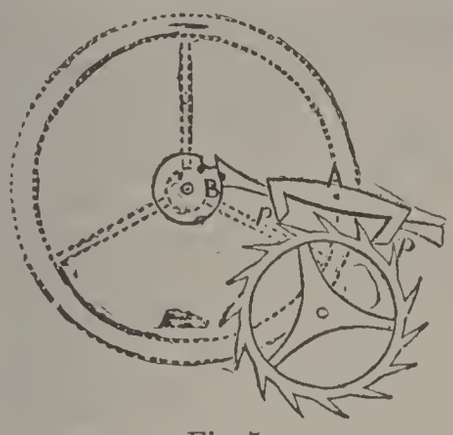


Fig. 5.

In watches, even more than in clocks, variations of temperature, unless provided for, produce variations in the rate of going, the increase or diminution of the temperature affecting to some extent the moment of inertia of the balance, and to a great extent the elastic force of the balance-spring. A rise in the temperature makes the balance expand, and therefore augments its moment of inertia; it adds to the length of the spring, and thereby diminishes its elasticity, the elastic force of a spring varying inversely as the length; and the time of vibration of the balance, which depends on the moment of inertia directly, and on the elastic force of the spring inversely, is increased—the watch, that is, goes more slowly—in consequence both of the increase of the inertia and of the diminution of the elastic force of the spring. A fall in the temperature gives opposite results, the watch going more rapidly. A watch without a compensated balance would vary much more than a clock without a compensation pendulum, were it not that, being usually carried in the waistcoat pocket, it is kept at a fairly uniform temperature. To invent a satisfactory compensation was at one time the great problem for watchmakers. The compensation can obviously be made in one of two ways—by an expedient for shortening the effective length of the balance-spring as the temperature rises, so as to increase the elastic force of the spring; or by an expedient for diminishing the moment of inertia of the balance as the temperature rises, so as to correspond to the diminution of the force of the spring. The first method was that made use of by John Harrison (q.v.), who first succeeded in making a chronometer capable of measuring time accurately in different temperatures; but

an adaptation of the other method, invented by Earnshaw, in the beginning of the 19th c., is now employed (fig. 6): *tat'* is the main bar of the balance; and *tb*, *t'b'* are two compound bars, of which the outer part is of brass and the inner part of steel, carrying weights, *b*, *b'*, which may be screwed on at different places. The brass bar expands more with heat, and contracts more with cold than the steel bar; therefore, as the temperature rises, the bars, with their weights, bend inward, and so the moment of inertia of the balance is diminished; as it falls, they bend outward, and the moment of inertia is increased; and of course the diminution or the increase must be made exactly to correspond to the diminution or increase in the force of the spring.

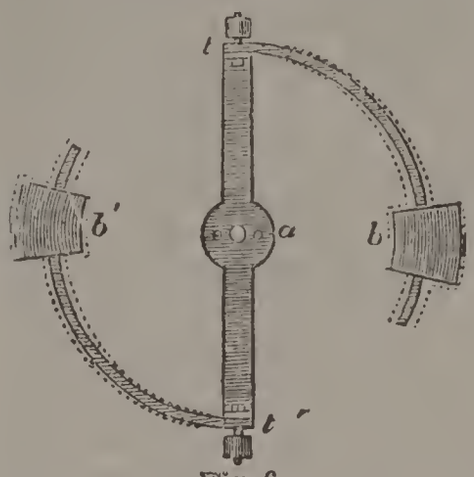


Fig. 6.

The chronometer is a large watch fitted with all the contrivances which experience has shown conducive to accurate time-keeping—e g., the cylindrical balance-spring, the detached escapement, and the compensation-balance. As a watch which will keep time in one position will often not do so equally well in another, marine chronometers are always set horizontally in a box in *Gimbals* (q.v.), an arrangement which keeps the chronometer horizontal, whatever the motion of the vessel.

The great importance of an accurate portable time-keeper at sea is for determining the Longitude (q.v.). This use was first distinctly pointed out by Sir Isaac Newton. In 1714 on the recommendation of a committee of the house of commons, of whom this philosopher formed one, a reward of £20,000 was offered by the Brit. government for the best means of finding the longitude especially by chronometers. The reward was finally awarded to John Harrison (q.v.) —Somewhat later, several excellent chronometers were produced in France by Berthoud and Le Roy, to the latter of whom was awarded the prize by the Académie Royale des Sciences. Progress was still made in England by Arnold, Earnshaw (inventor of the compensation still in use), and Mudge, to whom prizes were awarded by the Board of Longitude, and under whom a perfection nearly equal to that of the present day was obtained. The subsequent progress of watch-making has been directed chiefly to construction of pocket-watches on the principle of marine chronometers, or to the combination of accuracy with convenient portability. The adjusted lever watch is now made with a degree of accuracy which enables the performance to be warranted within an error of one second a day.

While the compensation of a chronometer can never be made perfectly accurate for all degrees of temperature,

there are always two temperatures at which a well-constructed chronometer will go with perfect accuracy. The explanation of this lies in the fact that while the variations of elastic force in the spring go on uniformly in proportion to the rise or fall of the temperature, the inertia of the balance cannot be made to vary as it should do, in exact correspondence to them inversely. The variation of the elastic force may be represented by a straight line inclined at some angle to a straight line divided into degrees of temperature; the corresponding changes of the moment of inertia will be represented by a curve, and this curve can coincide with the straight line representing the variations of elastic force only at two points, corresponding to two different temperatures. The particular points in the case of any chronometer are matter of adjustment. For instance, one chronometer may be made to go accurately in a temperature of 40°, and also in a temperature of 80°, at other temperatures being not so accurate; another chronometer to go accurately at a temperature of 20° and of 60°. It is manifest that the former would be adapted to voyages in a warmer, the latter to voyages in a colder, climate. Apparatus for testing chronometers has been long in use in some observatories. In a room isolated from noise and changes of temperature, the chronometers are arranged on a frame under a glass case, so contrived that they may be subjected in turn to any given degree of temperature. The rate of each under the different temperatures is observed and noted, and the chronometers registered accordingly. These observations are of great importance to ship-captains and to instrument-makers, who can have their instruments subjected to such observations on payment of a fee.

The mainspring had been employed as the moving force of time-keepers for about a century before the invention of the balance-spring; but very little is known about the action of these forerunners of the watch. A watch without a balance-spring must have been very rude and untrustworthy. The first proposal of the balance-spring was doubtless by Dr. Hooke; though Huygens and De Hautefeuille also invented it independently at about the same time.—See Denison's *Rudimentary Treatise on Clocks and Watches;* Wood's *Curiosities of Clocks and Watches;* Benson's *Time and Time-tellers* (1875).

Watch-making by Machinery.— The manufacture of watches by machinery has now acquired great importance in this country. In 1850 the art had its origin. A. L. Dennison and Edward Howard, of Boston, erected a watch factory at Roxbury, Mass., which establishment was removed 1854 to Waltham, Mass. The 'Waltham' watch has now attained a national and even a world-wide reputation: several years ago it had reached a production of about 350 movements a day, and was employing nearly 1,000 work-people. Every provision is made for the welfare of those employed, as in many parts of the manufacture a high degree of fidelity and skill is requisite. It is here mentioned

as being the oldest of the watch-factories, and as typical of this class of establishments.

Every part of the watch is made in these works by machinery. This secures absolute similarity; thus interchangeability of parts is carried to its full extent. Every part is gauged, sometimes down to 1-17-thousandth part of an inch. A watch can be 'assembled' at random from the pieces as turned out in quantity. Some of the screws are so minute that it takes 150,000 to weigh a pound. As each watch movement requires from 30 to 50 screws it will be evident that for a daily product of more than 2,500 watches more than 100,000 screws would be required. By the earlier methods employed in American watch factories an active man could make from 800 to 1,200 screws per day, so that more than 80 men would be required for the production of this large number. But within a few years screw-making machines have been devised which are capable of making from 4,000 to 10,000 screws each per day, and being entirely automatic in action, a single attendant is able to attend six or more machines. By suppressing the fusee, chain, and main-wheel, the pieces were reduced in number from about 800 to 158. The old chain alone contained several hundred pieces. An isochronous balance of wide range has proved ample to secure extremely accurate time-keeping. A large amount of special machinery is employed, much of which with special tools has to be provided for every new design of watch made.—Other manufactories of watches by machinery have been established, and turn out excellent watches; notably one at Elgin, Ill., of immense extent and admirable product, and one at Waltham, Mass.

WATCH HILL: post-village in Westerly tp., Washington co., R. I., on the Atlantic Ocean, and about 3 m. s.e. of Stonington, Conn. It is near Watch Hill Point, a promontory forming the extreme s.w. point of Rhode Island. The place has a fine beach and ranks next to Newport and Narragansett Pier, in Rhode Island, as a popular summer resort.

WAT'CHUNG, or Orange, Mountains, in New Jersey; a range of hills west of Paterson, Plainfield, and Orange, extending north and south, but curving westward at each end. Length, about 40 m. There are three divisions of the range, each composed of trap-rock, which was a lava flow about the time other portions of New Jersey were in a more advanced stage of formation. The mud and sand covering followed, and now the ranges are mostly shale and sandstone. The trap-rock, in places, forms elevations from 300 to 400 feet high, the soft sedimentary beds once enclosing it yielding more rapidly to erosion. There is a similarity in the material composition of the Watchung Mountains and the Palisades, the difference being more in the direction of the original lava flow. The Palisades sheet was not a surface flow, but was forced between the sedimentary beds.

WATER, n. *waw'tĕr* [Dut. *water;* Ger. *wasser;* Gr. *(h)udōr,* water: Icel. *vatr;* Sw. *vat;* Dan. *vaad;* L. *udus,* wet]: the fluid which descends from the clouds in rain; the liquid compound of oxygen and hydrogen which, when pure, is transparent, colorless, and destitute of taste or smell, and which is essential to the support of vegetable and animal life (see below): a body of this liquid whether standing or flowing; any liquid secretion resembling water; urine; the color or lustre of a diamond: V. to wet or overflow with water; to irrigate; to supply with water for drink; to diversify with wave-like lines, as silk; to shed liquid matter; to take in a supply of water; to dilute or weaken by the addition of water; hence *to water stock* is to reduce its value while increasing its bulk by the issue of new shares without any corresponding increase of actual capital. WA'TERING, imp.: N. the act of overflowing or sprinkling with water; the act of supplying with water for drink; the process of irrigating land; the process to which silk and other like fabrics are subjected to give them a wavy lustre and appearance. WA'TERED, pp. *-tĕrd:* ADJ. supplied with water; overspread or sprinkled with water; made lustrous and wavy. WA'TERER, n. *-tĕr ĕr,* that which or one who waters. WA'TERY, a. *-ĭ,* thin or transparent as a liquid; tasteless; moist; abounding with water; pertaining to, or consisting of, water. WA'TERINESS, n. *-nĕs,* state of abounding with water; moisture; thinness. WA'TERISH, a. *-ĭsh,* thin as a liquid; somewhat watery. WA'TERISHNESS, n. *-nĕs,* thinness; resemblance to water. WATER-BAILIFF, an officer in the customs for searching ships; one who watches a salmon-river to hinder poaching. WATER-BEARER, in *astron.,* the sign Aquarius (q.v.). WATER-BRASH, a hot sensation in the stomach, with the eructation of an acrid burning liquid that causes a distressing feeling in the parts over which it passes; also called *Pyrosis* (q.v.). WATER-BUTT, a large open-headed cask set up on end to contain rain-water. WATER-CALTROPS, an aquatic plant, the fruit of which is remarkable for the spines with which it is furnished; *Trapa natans,* the water-chestnut, also *T. bicor'nis,* ord. *Onagrācĕæ* (see TRAPA). WATER-CARRIER, a bearer or vendor of water. WATER-CARRIAGE, conveyance by water; means of transporting by water. WATER-CART, a cart carrying water either for sale, or for watering streets, etc. WATER-CASKS, vessels for holding water for a ship's use. WATER-CLOSET, a privy supplied with a flow of water from a cistern for the purpose of carrying off the discharges through a waste-pipe below. WATER-COCK, a tap for drawing water; a street-plug to supply water from mains. WATER-COLORS, in *paint.,* colors diluted and mixed with gum-water. WATER-COURSE, a channel for the conveyance of water. WATER-CRANE, a machine for supplying water to locomotive engines. WATER-CRESS; a small creeping plant growing in watery places, having an agreeable pungent flavor; the *Nastur'tĭum officinālĕ,* ord. *Cruciferæ* (see CRESS). WATER-CURE, a mode of treating diseases with water; Hydropathy (q.v.): ADJ. denoting an establishment where such treatment is employed; hydro-

pathic. WATER-DOCK, a broad-leaved water-plant, *Rumex aquaticus*, ord. *Polygonāceæ*. WATER-DOG, a dog which readily takes to the water; a sub-variety of the Poodle (q.v.), with head rather large and round, ears long, legs rather short, general form compact, hair long and curly but coarser and crisper than that of the poodle, 18 to 20 in. high at the shoulders, and much esteemed by wild-fowl shooters; *familiarly*, an old salt or sailor. WATER DRESSING, lint or other soft material, saturated with water only, applied to sores, wounds, etc. WATERFALL, a fall of water over a sudden break or precipice, sometimes of great height; a cascade; a cataract (see below). WATER-FLAG, a species of iris; the sedge. WATER-FOWL, a fowl which lives much on water, and obtains its food chiefly from it. WATER-GAUGE, an instr. for measuring the depth or quantity of water. WATER-GLASS, a water-clock or Clepsydra (q.v.); a liquefied flint made by boiling silica in an alkali. WATER-GOD, a deity supposed to preside over water. WATER-HEN, a water-fowl. WATER-LEVEL, the level formed by the surface of still water. WATER-LINE, in *ship-building*, the horizontal line supposed to be described about a ship's bottom at the surface of the water, the line being higher or lower according to the depth of water necessary to float her. LIGHT WATER-LINE, the line round a ship's bottom where the surface of the water touches when the ship is unloaded. LOAD WATER-LINE, the depth to which a ship sinks when loaded, or the line where the surface-water comes into contact with the ship's bottom. WATER-LOGGED, a. lying like a log on the water, as a ship, when a large quantity of water has got into the hold. WATERMAN, a boatman; a ferryman; a water-carrier. WATER-MARK, the mark or limit of the rise of water; a letter or device wrought into paper during the process of manufacture by the pressure of wires on the wet pulp. The most ancient known watermark is found on a document dated 1351 (see PAPER). WATER-MEADOW, a meadow that can be inundated and thus fertilized. WATER-MELON, a plant whose fruit abounds with a sweetish liquor resembling water in color, and which contains a rich and delicious pulp; the *Cucur'bita citrul'lus*, ord. *Cucurbitāceæ* (see MELON). WATER-METER, an instr. for registering the supply of water. WATER-MILL, a mill whose machinery is moved by water. WATER-NYMPH, in *anc. myth.*, a nymph presiding over, or frequenting, a particular piece of water; a naiad. WATER-PLANT, a plant found growing only in water. WATER-PLATE, a plate with a false bottom in which hot water can be stored, for the purpose of keeping the plate's contents warm. WATER-POWER, water employed to set and keep machinery in motion. WATER-POX, a popular term for the eruption of chicken-pox and the like. WATER-PROOF, a. so firm and close in texture as not to allow water to pass through; impervious to water: N. cloth rendered impervious to water; an overcoat, etc., made from such cloth: V. to render impervious to water. WATERPROOFING, n. any process or substance rendering leather or a textile fabric waterproof. WATER-RAT, a rodent animal frequenting streams, etc. (see VOLE). WATERSHED [see

SHED 3]: the range of high land in any district of country which forms the source of its various streams and rivers, shedding them off as it were from the roof of a house to their respective basins. WATER-SHIELD, aquatic plant, now classed with the water-lilies (see WATER-LILY), in the family *Nymphæaceæ* (q.v.). The only known species grows in slow streams or ponds, from Canada to the Gulf of Mexico, and on the border of Puget Sound; also in Australia and e. India. WATER-SNAKE, a snake which lives in or frequents water. WATER-SPOUT, a remarkable phenomenon, often observed at sea, appearing as a great pillar of water reaching from the sea up to dense clouds above (see WHIRLWIND). WATER-SPRITE, or -WITCH, a spirit supposed to frequent or live in water. WATER-TABLE, in *arch*., a projection or set-off in the wall of a building to throw off water. WATER-TABLES, in a *ship*, the sills of the windows in the stern. WATER-TIGHT, a. so close and tight as to hold water without leakage, or keep it from entering. WATER-WAYS, in a *ship*, pieces of wood around the ship at the junction of the deck with the sides, to prevent the entrance of water at the seam between them, and to strengthen both. WATER-WEED, a water-plant of recent introduction which has spread so rapidly as to have become almost universal; the *Anach'ăris alsinas'trum*, ord. *Hy'drocharidăcĕæ* (see ANACHARIS). WATER-WHEEL, machine for raising water in large quantities; wheel moved by water, and employed to set machinery in motion (see WATER-POWER). WATER-WORKS, works and machines for raising, retaining, and distributing water. WATER-WORN, a. smoothed and rounded by the action of water, as the pebbles in the bed of a river, or the gravel on the sea-shore. WATERING-PLACE, a place where water may be obtained for a ship, for cattle, etc.; a place to which people resort for drinking mineral water; a sea-bathing place. WATERING-POT, a nearly close pan or pail of tinned iron, and the like, with a long spout, terminating in a large, flat, or round hollow perforated disk (called a *rose*), used for watering plants, etc. WATER OF CRYSTALLIZATION, water which has combined chemically with a substance while passing from a state of solution to the solid crystalline form. HARD WATER, water largely impregnated with earthy or mineral ingredients. SOFT WATER, rain-water, or water nearly free from earthy ingredients (see WATER SUPPLY). IN HOT WATER, amid strife and contention; amid constant wearing care. WATERED SILK, silk with a shaded, wavy, or diversified surface, produced by moistening and pressure. TO HOLD WATER, to be tight; to be sound or correct; to be consistent with truth or reason. TO MAKE WATER, to pass urine; to admit water, as a leaky ship; to leak. THE MOUTH WATERS, the person longs; there is a vehement desire. BLOOD THICKER THAN WATER, phrase indicating that the natural ties of the family or national relationship will ultimately assert themselves in spite of trammels. MINERAL WATER: see under MINERAL

WATER.

WATER (symb. H_2O, at. wt. 18, sp. gr. 1): liquid abundant in nature, the compound of oxygen and hydrogen, which in a state of purity, at the ordinary temperature of the air, is a clear, colorless,* transparent liquid, perfectly neutral in its reaction, and devoid of taste or smell. At a temperature below 32° F. it freezes, crystallizing in various forms derived from the rhombohedron and six-sided prism. See ICE: SNOW: FUSING AND FREEZING POINTS: HEAT. It appears from the researches of Arago and Fresnel, that notwithstanding the gradual dilatation of water below 39°, its refractive power on light continues to increase regularly, as though it contracted. Its density at 60° F., and at the level of the sea, is taken at 1·000, and forms the standard of comparison for all solids and liquids, hydrogen being similarly taken as the standard of comparison for gases and vapors. Distilled W. is 815 times heavier than air; a cubic inch weighs, in air at 62°, with the barometer at 30 inches, 252·458 grains; and *in vacuo*, 252·722 grains; the grain being $\frac{1}{7000}$ of the avoirdupois pound: see AVOIRDUPOIS: GALLON. For all practical purposes, W. may be considered incompressible; but very accurate experiments have shown that it does yield to a slight extent under immense pressure; the diminution of volume for each atmosphere of pressure being about 51-millionths of the whole. W. evaporates at all temperatures; and under the ordinary pressure of the atmosphere, boils at 212°, passing off in steam, which, in its state of greatest density at 212°, compared with air at the same temperature, and with an equal elastic force, has a sp. gr. of 0·625. In this condition it may be represented as containing two volumes of hydrogen and one volume of oxygen condensed into two volumes. See BOILING: STEAM: VAPOR.

W. is the most universal solvent with which the chemist is acquainted; and its operations in this respect are equally apparent, though on very different scales, on the surface of the globe and in the laboratory. This solvent action is usually much increased by heat, so that a hot aqueous saturated solution deposits a portion of the dissolved matter on cooling. Some substances are so soluble in W. that they extract its vapor from the atmosphere, and dissolve themselves in it. Moreover, when W. is heated in a strong closed vessel to a temperature above the ordinary boiling-point, 212°, its solvent powers are much increased. Pieces of plate and crown glass, acted upon for four months by W. at 300° (in a steam-boiler), have been found reduced to a white mass of silica, destitute of alkali; while stalactites of siliceous matter, more than an inch in length, hung from the little wire cage which inclosed the glass—an experiment illustrating the action by which geyser springs

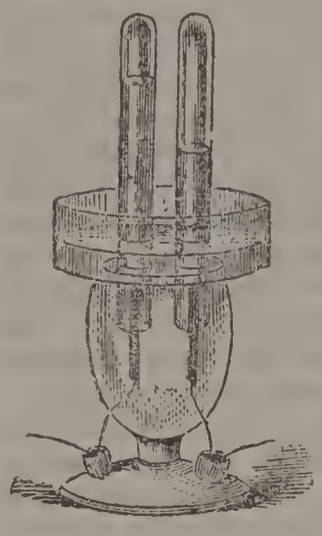
* Although water is colorless in small bulk, it is blue like the atmosphere when viewed in mass. This is seen in the deep ultramarine tint of the lakes of Switzerland and other Alpine countries, and in the rivers issuing from them; and in the water in the fissures and caverns of the glaciers, which, except on the surface, is extremely pure and transparent; and the deep blue tint of the ocean is due doubtless to the water itself, rather than to the salts dissolved in it.

deposit siliceous sinter. All gases are soluble in W, but it dissolves very unequal quantities of different gases, and very unequal quantities of the same gas at different temperatures. Some gases are so extremely soluble in this fluid that it is necessary to collect them over mercury; e.g., at 32°, 1 volume of W. dissolves somewhat less than $\frac{1}{50}$ of its volume of hydrogen, and exactly $\frac{1}{50}$ of its volume of nitrogen, while it dissolves 506 and 1050 volumes of hydrochloric acid and ammonia gases; and while at 32° W. dissolves 1·8 times its volume of carbonic acid, it dissolves only half that volume of the gas at 60°.

W. enters into combination with acids, bases, and salts. When an acid has once been allowed to combine with W. the latter can seldom be entirely removed unless by intervention of a powerful base, which displaces the W., and allows its removal by heat. E.g., if sulphuric oxide or anhydrous sulphuric acid be largely diluted with W., and exposed to heat, watery vapor alone at first passes off; but as the temperature is raised to about 600°, a point is reached at which acid and W. distil over together. The liquid at this stage of concentration is found composed of one equivalent of acid and one of water ($H_2O.SO_3 = H_2SO_4$). The further separation of the W. can be effected only by the addition of a base, as potash, oxide of lead, etc. W. which, as in this case, supplies the place of a base, is called *basic water*, and the compound is called a *hydrate*, or is said to be *hydrated*. Similarly, W. combines with strong bases, such as potash and soda, and heat can succeed only in reducing a mixture of potash and water to a condition represented by one equivalent of each ($H_2O + K_2O = 2KHO$); and this last equivalent of W. can be removed only by addition of an acid. In this case, the W. in combination with the base acts the part of an *acid*. These compounds also are *hydrates*. In these cases of acids and bases, the one equivalent of W. cannot be removed without completely altering the chemical character of the body (see, e.g., under SULPHURIC ACID, the difference between the properties of hydrated sulphuric acid and sulphuric oxide, or anhydrous sulphuric acid). In the case of many salts, however, a certain quantity of the W. entering, so to speak, loosely into their composition may be expelled by heat without altering the properties of the salt. The W. capable of being thus expelled is called *water of crystallization* and is taken up by the salt in the act of crystallizing. The form of the salt depends on this water of crystallization. In chemical formulæ, this variety of W. is often represented by Aq instead of by H_2O: e.g., in the formula for ordinary phosphate of soda or hydrodisodic phosphate—$Na_2HPO_4,12Aq$—the 12Aq represents 12 equivalents of water of crystallization.

It is but little more than a century since the ancient view that W. was one of the four elements ceased to be believed. It is now known that it is a compound of oxygen with hydrogen in the proportion of one of oxygen to two of hydrogen. Hence its symbol is H_2O, and its combining number 18. When converted into vapor, its density as compared

with atmospheric air (taken as unity) is 0·6235. That W is such a compound as above stated may be proved either analytically or synthetically; and the subject is so important in the history of chemistry that we present these two modes of proof. The following simple mode of separating W. by voltaic electricity into its constituent elements is from Watts's *Manual of Chemistry:* 'When W. is acidulated so as to render it a conductor, and a portion interposed between a pair of platinum plates connected with the extremities of a voltaic apparatus of moderate power, decomposition of the liquid takes place in a very interesting manner; oxygen in a state of perfect purity is evolved from the W. in contact with the plate belonging to the copper end of the battery; and hydrogen, equally pure, is disengaged at the plate connected with the zinc extremity; the middle portions of the liquid remaining apparently unaltered. By placing small graduated jars over the platinum-plates the gases can be collected, and their quantities determined.



The figure shows the whole arrangement; the conducting-wires pass through the bottom of the glass cup and away to the battery. When this experiment has been continued a sufficient time, it will be found that the volume of the hydrogen is a *very* little above twice that of the oxygen; were it not for the circumstance of oxygen being sensibly more soluble in W. than hydrogen, the proportion of two to one by measure would come out exactly.'— W., as has been shown by Grove, is decomposed likewise by heat. This effect is produced by passing sparks from an induction coil through steam from W. kept boiling in a flask fitted with a tube for conveying the gases into a tube closed at one end, and with its mouth dipping into a mercury-bath. The two gases are obtained in very small quantities at a time.—The composition of W. may be proved synthetically by mixing oxygen and hydrogen (both as pure as possible) in the proportion 1:2, and passing the mixture into a strong glass tube standing over mercury, and exploded by the electric spark: all the mixture disappears as gases, and the mercury is forced up into the tube; above the column of mercury is found a quantity of W. answering to the amount of its gaseous constituents in the tube. The most satisfactory form of this synthetical proof, however, is afforded by reducing pure oxide of copper at a red heat by hydrogen, and collecting and weighing the W. thus formed. The apparatus required for this experiment is Cavendish's explosion-vessel or eudiometer.

Owing to its extremely solvent powers, the *pure water* which we have been hitherto considering is never found in nature. The nearest approach to a natural pure W. is *rain-water*, after a continuance of wet weather; but even this W. always contains in 100 volumes about 2·5 volumes

of atmospheric air, with a trace of ammonia; and in fact it seems impossible to obtain W. which does not contain this ingredient; for, after two distillations, Prof. Miller found from 1·85 to 2·38 volumes of air in 100 volumes of water. In addition to rain-water, the other *natural waters* may be included under the heads *Spring-water, Mineral Waters* (q.v.), *River-water* (see WATER-SUPPLY), and *Sea-water* (see below).

A prolonged and acrimonious controversy continued for many years, and is probably scarcely yet settled, regarding the claims of different philosophers to the discovery of the nature and composition of W. In 1781 Cavendish made a long and careful series of experiments, unfortunately not pub. till 1784, Jan., when his celebrated memoir entitled *Experiments on Air* was read to the Royal Soc. In the interval (1783, June) his friend, Dr. Blagden, visited Paris, and on the authority of Cavendish gave to Lavoisier an account of the experiments proving the composition of W.; and this delay between the discovery and the date of publication caused his claims to one of the most marvellous discoveries that the world ever saw to be contested by an English and a French rival, James Watt and Lavoisier. Cavendish's experiments consisted in exploding, in various proportions, mixtures of hydrogen and atmospheric air, and of hydrogen and oxygen, and finding as the result a liquid which proved to be pure water. (Priestley and his friend Warltire had made similar experiments, and had noticed the deposition of moisture that followed the explosion, but failed to recognize in it anything but the condensation of aqueous vapors in the gases.) The general conclusion to which Cavendish came was, in his own words, 'that W. consists of dephlogisticated air united with phlogiston,' and as dephlogisticated air was his term for oxygen, and phlogiston his term for hydrogen, this statement corresponds to the modern view of the nature of W. introduced by Lavoisier. As Lavoisier was from the first accused by the English chemists of having acted unfairly toward them, and as indeed his own claim dates back only to 1783, June 25, he may be dismissed from further consideration; and during the lives of the English claimants there were no public complaints on either side, though Watt, in private letters to his friends, hinted at Cavendish's incapacity and unfairness. Hence, then—at all events, in Britain—scientific men were startled when Arago, then sec. of the French Acad., pub. (1838) the Eloge of Watt, which he had read as early as 1834, Dec., in which he charged Cavendish with deceit and plagiarism, inasmuch as he was said to have learned the composition of water, not by experiments of his own, but by obtaining sight of a letter from Watt to Priestley. The battle now fairly began; the first blow being struck 1839, Aug., when the pres. of the Brit. Assoc., the Rev. Vernon Harcourt, in his opening address vindicated Cavendish, and pointed out Arago's misstatement. At a subsequent meeting of the Acad., Arago, with Dumas to back him, defended his statements. Sir David Brewster (*Edin. Rev.*, 1840, Jan.) then sought to act as mediator;

and the controversy, as might have been expected, went on with increased acrimony, and involved many distinguished men—among the last of whom were Sir David Brewster, in the *North British Review* (1847), and Lord Jeffrey, in the *Edinburgh Review* (1848), both advocating the claim of Watt. As we have no space to discuss Watt's real claims, we merely add that Dr. George Wilson, whose *Life of Cavendish* gives an impartial history of the water-controversy, maintains on very sound grounds that Watt was informed of Cavendish's discovery through Priestley, as Lavoisier was through Blagden.

Sea-water.—For accurate knowledge of the composition of sea-water, we are indebted mainly to the investigations of Prof. Forchhammer of Copenhagen. Not very many years ago, the only elements known to exist in sea-water, in addition to those constituting W. itself, were chlorine, iodine, bromine, sulphur, carbon, sodium, magnesium, potassium, calcium, and iron. To these 12 must now be added, (13) fluorine; (14) phosphorus, as phosphate of lime; (15) nitrogen, as ammonia; (16) silicon, as silica, in which form it is largely collected by sponges from sea-water; (17) boron, as boracic acid; (18) silver; (19) copper; (20) lead; (21) zinc; (22) cobalt; (23) nickel; (24) manganese; (25) aluminium, as alumina; (26) strontium, as strontia; (27) barium, as baryta; (28) arsenic; (29) gold; (30) lithium; (31) rubidium; (32) cæsium. But most of these elements exist in infinitesimal quantities. The substances which, in respect of quantity, play the principal part in the composition of sea-water are chlorine, sulphuric acid, sodium, potassium, calcium, and magnesium; those which occur in less but still determinable quantity, are silicon (as oxide), phosphoric acid, carbonic acid, and iron. In the elaborate tables annexed to Forchhammer's paper he has always calculated the single substances, viz., chlorine, sulphuric acid, and oxides of magnesium, calcium, and potassium (magnesia, lime, and potash), and the whole quantity of salt for 1000 parts of sea-water; but besides this, he has calculated the proportion between the different substances determined, referred to chlorine = 100, and of all the salts likewise referred to chlorine. This last number is found if we divide the sum of all the salts found in 1000 parts of any sea-water by the quantity of chlorine found in it; and he terms it the *coefficient* of that sample of sea-water. (The term *coefficient* will now doubtless be permanently retained by writers on the chemistry of sea-water.) This chemist divides the sea into 17 regions, his reasons being that he could thus avoid the prevailing influence which those parts of the ocean which are best known, and from which he has taken most observations, would exert on the calculations of the mean number for the whole ocean. In reference to the *salinity* of the surface of the ocean, he has made the following observations. (1.) The mean salinity of the Atlantic between 0° and 30° n. lat. is 36·169 (i.e., this is the quantity of salts in 1000 parts of water); the maximum, which is also the maximum of the surface-water of the whole Atlantic, being 37·908, and occurring in 24° 13′ n. lat., and about 5°

w. from the coast of Africa, where no rivers of any size carry water from the land, and where the influence of the dry and hot winds of the Sahara is prevalent. This maximum is equal to the mean salinity of the Mediterranean, and is exceeded only by the maximum of that sea off the Libyan Desert, and that of the Red Sea. The minimum is 34·283 in 4° 10′ s. lat., and 5° 36′ w. long., close to the coast of Africa, where the large masses of fresh water which the great rivers of that region pour into the ocean exercise their influence. (2.) In the Atlantic, between 30° n. lat. and a line drawn from the n. point of Scotland to the n. point of Newfoundland, the mean salinity is 35·946, the diminution being due to the fresh water poured into it by the s. mouth of the St. Lawrence. (3.) In the Baffin's Bay and Davis' Strait region, the mean salinity is 33·281, and the salinity increases from latitude 64° toward the n., being in 64°, 32·926, and in 69°, 33 598. This peculiarity is owing (says Forchhammer) to the powerful current from the Parry Islands, which through different sounds passes into Baffin's Bay, where it is mixed with the great quantity of fresh water that comes into the sea from the w. Greenland glaciers. (4.) From 11 observations on the Mediterranean between the Straits of Gibraltar and the Greek Archipelago, he confirms the old view of its great salinity; its mean salinity being 37·936, while that of the whole ocean is 34 388. Its maximum (39·257) is between the island of Candia and the African shore; and its minimum (36·301) is at the Straits of Gibraltar. These results are due to the influence of Africa and its hot and dry winds. In salinity, the Mediterranean is exceeded only by the Red Sea, whose mean salinity is 43·067. (5.) The Black Sea, like the Baltic, is a mixture of salt and fresh waters. In three different experiments, the salinity varied from 18·146 to 11·880. At a distance of 50 m. from the Bosphorus, the proportions between chlorine, sulphuric acid, lime, and magnesia were 100 : 11·71 : 4·22 : 12·64; while the normal oceanic proportions are 100 : 11·89 : 2·96 : 11·07; thus showing relative increase in the lime and magnesia. (6.) In the Caspian Sea the salinity varied between 56·814 and 6·236, and the proportion between the chlorine, sulphuric acid, lime, and magnesia is 100 : 44·91 : 9·34 : 21·48, which differs extremely from the normal proportion. (7.) The Atlantic between 30° s. lat. and a line from Cape Horn to the Cape of Good Hope, is less saline than the corresponding region n. of the equator; and all the samples from the w. part of this region have less, while the samples from the e. part, nearer the African coast, have considerably more sulphuric acid than the normal quantity. (8.) In the sea between Africa and the E. India Islands the mean salinity is 33·868. The minimum (25·879) is from a place far up in the Bay of Bengal, and of course much influenced by the Ganges: it lies, however, about 300 m. from the mouth of that river; and another specimen from 60 m. nearer the mouth has a salinity of 32·365, so that it would seem as if some other cause (possibly fresh-water springs at the bottom) had been in operation to weaken the sea-water at the minimum spot.

(9.) In the Patagonian cold-water current, the mean salinity was 33·966; while three samples brought from the S. Polar Sea, by Sir James Ross, had different salinities of 28 565, 15·598, and 37·513. Forchhammer cannot account for these discrepancies. All the specimens showed great excess of sulphuric acid (12 47 instead of 11·88, as compared with 100 of chlorine), a result due probably to the volcanic nature of the antarctic continent. Forchhammer's analyses of waters from other of his 17 districts call for no remark; we need cite only the general result, viz., that if we except the North Sea, the Kattegat, Sound, and Baltic, the Mediterranean and Black Sea, the Caribbean Sea and the Red Sea, which have all the characters of bays of the great ocean, the mean numbers are the following:

Sea-water.	Chlorine.	Sulphuric Acid.	Lime.	Magnesia.	All Salts.	Coefficient.
1000	18·999	2·258	0·556	2·096	34·404	1·812
	100	11·88	2·93	11·03		
Equivalents,	429	45	16	82		

Thus it is evident that the sea-water, in its totality, is as little a chemical compound as the atmospheric air; that it is composed of solutions of different chemical compounds; that it is neutral, because it everywhere in the atmosphere finds carbonic acid to neutralize its bases, and everywhere on its bottom and shores finds carbonate of lime to neutralize any prevailing strong acid; that lastly, the great stability of its composition depends on its enormous mass, and its constant motion, which occasions that any local variation is evanescent compared to the whole quantity of salt.

From these remarks on the *surface-water*, we pass to the difference of sea-water in *different depths*. On this subject, the result from the analyses of specimens of sea-water taken from different regions is so contradictory, that we merely quote the sentence with which Forchhammer begins this department of his subject: 'It would be natural to suppose that the quantity of salts in sea-water would increase with the depth, as it seems quite reasonable that the specific gravity of sea-water would cause such an arrangement. But this difference in specific gravity, relative to the increase in the quantity of salts, is counteracted by the decreasing temperature from the surface to the bottom. We have parts of the sea where the quantity of solid salts increases with the depth; in other parts, it decreases with the increasing depth; in other places, hardly any differences can be found between surface and depth; and lastly, I have found one instance where water of a certain depth contained more salt than both above and below. These differences are, to a great extent, dependent upon currents both on the surface and in different depths.' Sometimes, salinity of the surface-water is the same as that of the deep: or one or more ingredients may vary in its proportions.

How did the salts which now occur in the sea come into it? Is it the land that forms the sea, or is it the sea that makes the land? Are the salts that are now found in sea-water washed out of the land by the atmospheric water? Has the sea existed from the beginning of the earth? and has it slowly but continually given its elements to form

the land? To these questions Forchhammer replies substantially as follows: Suppose a river had its outlet in a valley, with no communication with the sea; the valley would be filled with water till its surface was so great that the annual evaporation was equal to the annual supply. There would then be a physical but not a chemical equilibrium, because the annual loss would consist of pure water, while the received water would contain various mineral or saline matters, which would go on increasing till chemical changes would occasion precipitation of different salts. Now, in the water of the assumed river, we should find the bases prevailing in the following order—calcium, magnesium, sodium, iron, manganese, and potassium; while the acids, similarly arranged, were carbonic, sulphuric, muriatic (chlorine), and silicic. Now, all these substances are found in sea-water, though in very different proportions. The ocean is, in fact, such a lake as we have here supposed, with all the rivers carrying their dissolved matters into it. Why, then, our author asks, do we not observe a greater influence of the rivers? Why does not calcium, the prevailing base of river-water, occur in a greater proportion in the water of the ocean? In all river-water the number of equivalents of sulphuric acid is much smaller than that of calcium; yet we find in sea-water about three equivalents of sulphuric acid to one of calcium. There must thus be in sea-water a constantly acting cause that deprives it again of the calcium which the rivers furnish; and this cause we find in the shell-fishes, the corals, the bryozoa, and all the other animals which deposit carbonate of lime. These animals not only deprive the water of its carbonate of lime, but they likewise decompose the sulphate of lime—a decomposition probably depending on the carbonate of ammonia formed by the vital processes of these animals. The silica, always present in river-water, is appropriated by the varied sponges, diatoms, etc.; hence its scantiness in sea-water. With regard to the sulphuric acid conveyed into the sea, a small part enters into the composition of shells, corals, etc., and a greater part is attracted by sea-weeds, in which it undergoes reduction, as above described, while the rest remains in the sea-water. The magnesium of the river-water enters in small quantity into marine shells and corals; but only a small quantity is thus abstracted from sea-water, while the sodium and muriatic acid or chlorine form, as far as we know, by the pure chemical or organo-chemical action that takes place in the sea, no insoluble compound. Thus, he concludes, the quantity of the different elements in sea-water is proportional not to the quantity of elements which river-water pours into the sea, but inversely to the facility with which the elements in sea-water are made insoluble by general chemical or organo-chemical actions in the sea, and we may infer that the chemical composition of the water of the ocean in great part is owing to the influence which general and organo-chemical decomposition has on it, whatever may have been the composition of the primitive ocean.

WATER.

Use of Water.—In considering the suitableness of a water for domestic use attention should be principally paid to (1) the source of the supply, (2) the total solid matter held in solution by the water, (3) the organic matter held in solution, and (4) the action which is likely to be exercised on the water by the means of supply. Let us consider these points briefly. In examining the source of a water supply attention should be especially paid to the proximity of drains or sewers of any description, and to the likelihood of contamination from these sources. The nature of the soil through which the water percolates should also be inquired into. The solid substances held in solution by a sample of water may be estimated by evaporating a measured quantity of the water to dryness in a platinum basin heated by steam, and weighing the residue. From a knowledge of the total solids in a water, unaccompanied by any further information, no reliable conclusion as to the suitability of such a water for potable purposes can be deduced. In seeking to determine whether a sample of water has undergone contamination with hurtful organic matter the following points are to be more particularly attended to: (1) Estimation of the amount of chlorine, whether existing as hydrochloric acid or as a chloride; (2) estimation of ammonia; (3) estimation of nitrates; and (4) detection, and estimation, if necessary, of poisonous metals. The presence of an undue amount of chlorine generally points to contamination with animal matter. Pure waters do not as a rule contain more than three to four grains of chlorine per gallon. It must, however, be borne in mind that such waters as flow through a soil rich in chlorides—such, for instance, as the waters found in the neighborhood of the Cheshire salt-beds—always contain large quantities of chlorine. The sudden appearance of chlorides in a water previously free or nearly free from these substances points to animal contamination.

Ammonia may be obtained from most waters by distillation after the addition of a little sodium carbonate; when the whole of this ammonia has been driven off it not infrequently happens that the addition of an alkaline solution of permanganate of potassium and heating results in the production of a further quantity of ammonia. The ammonia obtained by the first distillation is usually spoken of as 'free ammonia,' while to that obtained by the second distillation the name of 'albumenoid ammonia' is given. The presence of even small quantities of albumenoid ammonia points unmistakably to organic contamination. Such ammonia is derived from the decomposition, by the agency of the alkaline permanganate liquid, of nitrogenous matter of animal or vegetable origin. Pure water should not contain more than 0.10 parts of 'free' ammonia per million, nor more than 0.08 parts of 'albumenoid' per million.

If nitrogenous matter has become thoroughly oxidized

it gives rise to the formation of nitric and nitrous acids. The presence of these acids or of their salts, therefore, generally points to previous contamination of some organic nature. As, however, these things are the harmless—that is, in the quantities in which they occur in waters—products of the decomposition, and therefore of the removal, of hurtful substances, their presence, even when in comparatively large quantities, ought not of itself to condemn a water. The poisonous metals which are most likely to occur in drinking waters are lead and copper. These may be easily detected and estimated even when present in exceedingly minute quantities. For details of the analytical methods of water analysis reference must be made to manuals of applied chemistry. It is evident that in a water analysis we look for symptoms of a disease; not for substances which are in themselves hurtful, but for substances whose presence is associated more or less invariably with others, the action of which upon the system cannot but be most pernicious.

In storing water for domestic purposes the water may undergo contamination from the vessels containing it or from proximity to drains or other places emitting noxious gases. It is certain that water exercises a solvent action upon lead; but our ordinary leaden water cisterns become coated with a comparatively insoluble compound of lead, so that the danger of contamination from this source is not great. Hot water should never be stored in leaden cisterns; it very quickly corrodes and dissolves the metal. Aerated waters act rapidly on lead; for this reason they should never be prepared in leaden vessels. The solvent action of water on copper is very small. The system of storing water for drinking or cooking in cisterns close to, or even communicating with, the house drainage system, is a very bad one. In some circumstances, as in the case of swimming-baths, large quantities of water have to be heated to a certain temperature and kept at the same for a considerable time while the water has to be maintained in a due condition of purity.

WATER BALANCE: an oscillating pendulous frame, having a series of troughs in vertical series and inclined in alternate directions, so that, as the frame oscillates, the water dipped by the lower one shall be poured into the next above, which, on the return motion, shall pour it into the next, and so on.

WATER BED: a contrivance for relieving any partial pressure of the body of a patient long confined to bed, and so preventing the formation of ulcers which arise from such local pressure. These beds are of various kinds. One form is that of a trough half-filled with water, covered by a loose lining of india-rubber sheeting attached all around to the upper edge of the trough so as to be watertight, a mattress being laid between the invalid and the lining. Another form is that of a large waterproof bag which is laid upon an ordinary mattress

and half-filled with water, the weight of the body resting upon this directly or with bed clothes between.

WATER-BEETLES: the numerous species of beetles which inhabit water. A common mode of life does not indicate blood relationship, and the various aquatic beetles belong to a number of quite distinct families. Besides those which are aquatic throughout their lives quite a large number of beetles live in or near the water only during the larval period. The strictly and permanently aquatic beetles belong chiefly to three families. The diving beetles (*Dytiscidæ*) are predaceous throughout life and represent in the water the *Carabidæ*, to which they are somewhat closely related, on land. The legs in these insects are adapted for swimming, the two hinder pairs being flattened and fringed with hairs. The body is oval and flattened. The mandibles are short and strong, and the thorax is broad. The front legs are short and the antennæ long and filiform. In the genus *Dytiscus* the tarsi of the males are wide, flat, and provided with sucking disks, while those of the females are unmodified. Moreover, the females are of two forms, the one having the wing-covers smooth, the other grooved. The head is short, and received into the thorax. *D. fasciventris* is the common water-beetle of our ponds. These insects carry a supply of air for breathing beneath the *elytra* or wing-covers. At evening they fly in the air. They are eminently carnivorous in habits, and feed on other insects. The larvæ are active creatures, and are also aquatic; their noteworthy rapacity has gained for them the name of water-tigers, which they well merit, for they will not hesitate to seize in their sharp sickle-like jaws any insect-larvæ, small fish, or tadpole that comes within reach, and after draining its juices discard the dead body. The tail is terminated by a pair of respiratory tubes which are raised above the surface of the water to effect respiration. Besides this large species the family includes numerous small ones having similar habits. The other two families have club-shaped instead of filiform antennæ. The largest of the common water-beetles belong to the family *Hydrophilidæ*, which, however, also includes numerous small and inconspicuous species. In the form of the body and the fringed oar-like middle and hind legs they resemble the *Dytiscidæ*, from which all the members of this family are, however, at once distinguished by their short strongly-clubbed antennæ. The great water-beetle (*Hydrophilus triangularis*) is a pitchy black polished beetle an inch and a half long, often seen flying at night, or during the day rising to the surface of clear weed-grown ponds for air and, unlike the *Dytiscidæ*, usually resting head upward. In adult life they forsake the predaceous habits and animal diet of their larvæ and become scavengers. Few inhabitants of fresh-water ponds and ditches are better suited to life in an aquarium than these beetles and few present a greater variety or more interesting habits.

WA'TERBRASH: see PYROSIS.

WA'TER-BUDGET: heraldic bearing in the form of a yoke with two pouches of leather appended, originally intended to represent the bags used by the Crusaders to convey water across the desert.

WA'TER-BUG: one of a tribe or section of heteropterous insects, *Hydrocorisæ*, which live almost entirely in water, and feed on other aquatic insects. The anterior portion of the first pair of wings is horny; the antennæ are very small, and concealed beneath the eyes. The *Hydrocorisæ* are divided into two families, *Notonectidæ* and *Nepidæ*. Of the former, the Boat-fly (q.v.) is an example. The *Nepidæ* are popularly known as WATER-SCORPIONS, from the form of their forelegs.

WATERBURY, *waw'tĕr-bĕr-ĭ:* city in New Haven co., Conn.; on the Naugatŭck river, and on the New York New Haven and Hartford, the New York and New England, and the Meriden Waterbury and Connecticut river railroads; 21 m. n.n.w. of New Haven, 33 m. s.w. of Hartford, 88 m. n.e. of New York. It is in a well watered valley which provides abundant water-power for mechanical uses; is surrounded by hills; and is a marketing centre for a large territory. The city is tastefully laid out, well drained, lighted with gas and electricity, and supplied with water by one of the most costly and complete systems in New England. The principal streets radiate from a handsome public park, on the borders of which are the new city hall and St. John's Church (Prot. Epis.). There are many social organizations in W. including the Waterbury, Women's, Daughters of the American Revolution, Naturalists', and other clubs. There are more than 30 churches, public library, public hall, Y. M. C. A., several hotels, high school, Academy of Notre Dame (Roman Catholic convent school), Waterbury, Eng. and Classical School for Boys, St. Margaret's School for Girls (Prot. Episc.), national banks, savings banks, private bank, and daily, weekly, and monthly periodicals. There are more than 30 school buildings, with an enrollment of nearly 9,000. W. is noted for its manufactures of brass goods, producing annually about three-fifths of all the brass goods manufactured in the country. In 1900 the brass and copper industry was carried on with a capital of $9,690,142, paid $2,573,121 in wages, used materials that cost $8,821,328, and yielded products valued at $13,239,031. The industries of W. include the making of all brass-work, pins, buttons, pearl goods, lamps, wire, plated and brittonia ware, electric appliances, automatic switches, chemicals, boots and shoes, knitted goods, cutlery, paper boxes, hinges, traps, and aluminum goods. There are several rolling mills and iron foundries. W. was settled 1667 as Mattatuck, and received city charter 1853. Pop. (1900) 45,859; (1910) 73,141.

WATERBURY, David: soldier: 1722, Feb. 12--1801, June 29; b. Stamford, Conn. He participated in the French and Indian war; was in the battle of Lake George 1755, and in the attack on Ticonderoga 1759; was with Montgomery at Quebec, as lieut.col. of the 9th Conn. regt., 1775; as brigadier he commanded at Skeensboro (Whitehall), N. Y., where a flotilla was building 1776 for service on Lake Champlain; and Oct. 11, while in command of a vessel in the action at Valcour Bay, was taken prisoner. He was charged with cowardice in striking his colors without firing a shot; but the charge was never made subject-matter of trial by court-martial; besides, W.'s commanding officer, Gen. Benedict Arnold, in reporting the engagement declared that W.'s ship was hit several times, in the hull. On being exchanged 1781, he received command of a brigade, and served in the field till the end of the war. He then went back to his farm, and represented his town, Stamford, in the state assembly repeatedly.

WATER-CHESTNUT: edible seed of the *Trapa natans* (see Trapa), called in France *Marron d'Eau*. The name W.-C. is given also to the edible tubers of the *Scirpus tuberosus*, plant of nat. order *Cyperaceæ* (see Bulrush: Cyperaceæ), which is cultivated by the Chinese in tanks abundantly supplied with manure. It is destitute of leaves, except a slender short sheath or two at the base of each culm. It is stoloniferous, and the tubers are produced on the stolons. They are prized among the Chinese, both for food and as medicine, and are eaten either raw or boiled. They are called *shui-leih* (literally, 'water-chestnut'), *p'oh-tsi*, and *ma-ti* ('horse's hoof').

WATER-COLOR PAINTING: the most delicate of the graphic arts; artistic painting in which are employed pigments mixed with water instead of oil. It was in England first that it attained to the dignity of a recognized artistic pursuit, and came to be—what it now is—admittedly the rival of oil-painting in brilliancy and power. Of late years it has been practiced by eminent artists in various countries, as France, Germany and Austria, and the United States.

In the illumination of missals, water-colors were used mixed with the body white; and the same is true of the miniature-painting of the 18th c. Frescoes and painting in tempera also were in a sense works in water-color. But the art as now practiced had its origin in a different way. Dürer and some German, Flemish, and Dutch artists were accustomed to outline their drawings with a reed pen, and fill in those outlines with an auxiliary flat wash. Gradually the hard lines were replaced by touches with the brush, and the result was a monochrome in browns and grays, bistre or Indian ink. These, again, came to be tinted, and so suggested the full use of colors. Rembrandt often drew in brown, and added dashes of strong color; and Rubens produced something very like modern water-color drawings.

The modern art became emancipated from the old traditions by 'gradual disuse of the general shadow tint, and imitation of the local color, not alone of the objects them-

selves, but of every modification resulting from light, dark, half-tint or distance, a method which at once led to far greater truth and richness than could ever have been attained by merely passing color over the universal shadow tint.' The stained drawing gradually gave way to the more perfect tinted drawing. But the tinted style predominated till 1790; and the water-colors of the 18th c. were tinted monochromes. Thomas Girtin and Joseph M. W. Turner (q.v.) showed what scope and power were in the art.

British artists who used the stained and tinted manner were Malton (1726–1801); Paul Sandby, R.A. (1725–1809), often termed, though without justification, 'the father of water-color art;' also (all in the last half of the 18th c.) Grimm, Webber, Clevely, Pars, and Rooker. Wheatley Westall, and Gilpin used water-color as well as oil. Rowlandson, Cristall, Hills, Wright, Mortimer, Gresse, Hearne, J. R. Cozens, and Dayes greatly promoted the growing art. Nicholas Pocock (1749–1831) showed a new richness and force. John Smith (Warwick Smith) first escaped from the weakness of mere tinting. Thomas Girtin (1773–1802) attained great richness of tone and breadth; his compositions were grand but simple; he massed light and shade in broad and sometimes abrupt forms. J. M. W. Turner (1775–1851: see TURNER) soon distanced all his predecessors and contemporaries, and in his hands water-color painting became a new art. He wholly abandoned preliminary tinting; minute details are imitated in local color: his work is marked by breadth, fulness, warmth as well as grace. Other more or less important names are those of Delamotte, Varley, J. J. Chalon, A. E. Chalon, Samuel Prout, Peter de Wint, Liverseege, Cotman, David Cox (q.v.), Essex, Richardson, Newton, Copley Fielding, Robson, W. Hunt, Ross, Harding, Cattermole, Holland, Penley, Lewis, Houghton, Pinwell, and Henry Warren (q.v.): more recent are Birket Foster, Sir John Gilbert, Herkomer, etc.

At present, water-color paintings may be divided into three kinds: (1) those where the coloring is mainly transparent; (2) where it is usually opaque; (3) where transparent, semi-transparent, and opaque colors are freely used in combination. The quick drying of the water-color pigments is favorable to rapid execution; and greater clearness of color is attained than is practicable in oils. The progress of the art has been greatly promoted by modern chemistry developments in preparation of the colors—great variety of really permanent colors being now procurable. These are various pigments ground with gum or other mucilage, and may be kept in cakes, the usual vehicle for moistening and applying them being gum-arabic and water. But for artists they are now usually prepared so as to be kept moist in small earthenware pans or metallic tubes.

The Brit. Soc. of Painters in Water-colors was instituted 1804; it held its first exhibition 1805; and its annual exhibitions are now as crowded as those of the Royal Acad. Formal recognition of its dignity was accorded 1882, when the society obtained a charter, and became the Royal Soc.

of Painters in Water colors. There are other Brit. associations—e.g., the Institute of Painters in Water-colors. An admirable collection illustrative of the history of the art is in the South Kensington Museum.—The Amer. Water-color Soc. held its 23d annual exhibition (1890) in the New York Acad. of Design; exhibiting 645 works by such artists as Edwin A. Abbey, Hamilton Gibson, Henry Farrar, William Magrath, Thomas Moran, Walter Shirlaw, Bruce Crane, Ross Turner, Bolton Jones, W. T. Smedley. There is also an Amer. Soc. of Pastel Painters; it held its 4th annual exhibition (1890) in New York. Among the members were William M. Chase, Walter Palmer, Bolton Jones, Theodore Robinson, Rosina Emmet Sherwood.—See PAINTING—*Water-color Pictures.*

See Redgrave's *Introduction* to the Catalogue of Water-colors at South Kensington (1877); P. G. Hamerton's *Graphic Arts* (1882).

WA'TER-COLORS: painters' colors mixed with water and some adhesive material, as gum or size, instead of oil. Water-colors intended for drawings on paper are prepared with great care, and are usually formed into dry cakes, etc., with gum: four forms are in use—cakes, pastilles, pans, and tubes.—See WATER-COLOR PAINTING.—Those for coloring walls and scene-painting are roughly prepared with glue or size: these are often called Distemper Colors, from the Italian term *tempera*: see DISTEMPER. See PAINTING.

WA'TERCOURSE, in Law: any stream of water flowing naturally in a channel or bed: the term does not include the occasional courses of waters from a higher to a lower level, as after a heavy rain-storm or when heavy snows melt. In law a W. is comprised under the designation 'land;' hence a conveyance of land is conveyance of the streams passing through the land, as of the soil. When a W. is the boundary between estates or properties, the owners of the lands are called *riparian* proprietors. The property rights of riparian proprietors occupying lands on opposite sides of a stream extend on each side *ad medium filum aquæ* (to the central line of the stream). All the proprietors on the line of a W. possess precisely the same measure of rights in the W.; and none is permitted to make such use of the stream as to impair its equal use by all the rest, whether up-stream or down-stream.—In the United States a navigable river between two or more states is subject to the control of congress. The jurisdiction of navigable waters is not always determined by the *medium filum aquæ* when two separate state jurisdictions exist on the opposite banks.—See RIVER.

WA'TER-DROP'WORT: plant of the genus *Œnanthe*, nat. order *Umbelliferæ;* having ovato-cylindrical fruit, not prickly nor beaked, each carpel with five blunt convex ribs, and single vittæ in the interstices; calyx teeth lanceolate; petals obcordate and radiant, with an inflected point; partial involucre of many rays; flowers of the circumference on long stalks and sterile, those of the centre subsessile and

fertile. A number of species, large perennial plants, with a strong and generally disagreeable aromatic smell and compound or decompound leaves, are natives of Great Britain The COMMON W. (*Œ. fistulosa*) and the HEMLOCK W., or WATER-HEMLOCK (*Œ. crocata*), are common in wet places throughout Europe, and both are narcotic acrid poisons. The roots of the latter have some resemblance to small parsnips; hence fatal results have often followed the mistaking one for the other.—The FINE-LEAVED W., called Water-fennel by the Germans (*Œ. phellandrium*, formerly known as *Phellandrium aquaticum*), also is common in ditches and ponds in Europe. It has a jointed root-stalk (*rhizome*), with tufted whorled fibres, and a strong zigzag stem dilated at the base. The leaves are decompound. The fruit has a peculiar aromatic but disagreeable smell. It is not so poisonous as the species above named. It was formerly erroneously regarded as a specific against pulmonary consumption.—The Water-hemlock of the United States is of the genus *Cicuta*, the twin fruit subglobose; *C. maculata* has the stem 3–6 ft. high, streaked with purple, leaflets coarsely serrate, roots a deadly poison; *C. bulbifera* has linear leaflets, remotely toothed. The poisonous Water-parsnip, of which we have several species, is of the genus *Sium*. Poison-hemlock, with spotted stem, naturalized from Europe, is of still another genus, *Conium*.

WATEREE, *wŏt-ĕr-ē'*, RIVER: stream formed by junction of the Catawba and Fishing creek in N. C.; flowing s.e. into S. C., where it unites with the Congaree to form the Santee. Steamboats ascend the W. to Camden, 200 m. from the sea.

WA'TERFALL: a break in the continuity of slope of the channel of a river or stream, so abrupt that the body of water *falls* from the higher to the lower level. Waterfalls are most frequent in mountainous countries, where the streams from the mountain-sides enter the valleys. It is only when there is a shelf of hard rock that there can be a waterfall; in friable strata the stream wears out a ravine or side-valley. These mountain waterfalls, however, are generally rather curious and picturesque than grand, the volume of water being in most cases small, though the height of fall is occasionally very great. All mountain waterfalls necessarily change their aspect from season to season—in winter, a roaring torrent plunging headlong into the abyss; in summer, often a mere film of water trickling down the face of the precipice. Waterfalls in comparatively level districts often have a much greater volume of water, and some are among the grandest of nature's phenomena. It is where the course of a large river passes from a higher to a lower plateau, and where the upper plateau is edged with rock, that the grander cataracts are formed. If the rocks are of the same hardness from top to bottom, the edge of the escarpment, supposing it to be perpendicular at first, becomes worn off, and a slope or *rapid* is formed. But when the upper edge is hard and the under-strata soft and friable, the reverberation of the spray wears away the softer parts below, leav-

ing a projecting ledge at the top, which breaks off, piece by piece, as it becomes too much undermined: thus the fall is constantly receding. This is illustrated on a large scale at Niagara, which, as it recedes beyond the soft strata, dipping southward, must eventually become all rapids, descending a slope of the limestone which now forms the shelf. For the rate of the recession see ANTHROPOLOGY. Some of the most remarkable waterfalls of the world are the Yosemite, Cal., a fall 2,550 ft., broken into three leaps; the Orco Falls at Monte Rosa, 2,400 ft.; Gavarnie (Pyrenees), 1,400 ft.; Staubbach (Switzerland), 1,000 ft.; Maanelvan (Norway), 940 ft.; Niagara (q.v.); Zambezi (q.v.); Missouri; the great Kaieteur fall in Brit. Demerara, more than 700 ft. The cataracts of the Velino and Anio, in Italy, are beautiful artificial imitations.

WA'TER-FLEA: a minute crustacean of the order *Cladocera*, family *Daphniadæ*, which skips about in the water like a flea. Water-fleas are abundant in pools and ditches everywhere. The W.-F. comes to the surface in the mornings and evenings, but keeps near the bottom during the heat of the day. It swims by taking short springs, whence its popular name. It feeds on minute particles of both animal and vegetable substances. It is a beautiful object for the microscope, the whole interior organization being visible through the transparent carapace. The male is much smaller than the female, and comparatively rare. The eggs, after leaving the ovary, are retained in a cavity between the body and the carapace, until the young have almost attained their perfect form.

WATERFORD, *waw'tĕr-fĕrd:* maritime county of Ireland, province of Munster; bounded n. by the counties of Tipperary and Kilkenny, e. by Wexford, s. by the Atlantic, w. by the county of Cork; greatest length from e. to w. 52 m.; breadth n. to s. 28; 721 sq. m., or 461,563 acres, of which 325,345 are arable, 105,496 waste, 23,468 in plantations, 526 in towns, and 5,779 under water. The coast-line extends from the estuary of the Suir, Waterford Harbor, to that of the Blackwater at Youghal; and is partly flat, partly rocky, but in general very dangerous for shipping. The rocky district contains remarkable caverns. The surface is in general mountainous; the principal ranges being Knockmeledown, the Cummeragh, Monevolagh, and Drum. The Cummeragh Mts. are the loftiest, and abound in wild and picturesque scenery. The Suir (q.v.) and the Blackwater (q.v.) are the chief rivers. The climate is moist, and much of the soil is marshy; but the upland districts are well suited for tillage, and the lower pasture-lands, though inferior in fattening properties to those of the great central plain, produce excellent butter, which is largely exported. In geological structure the mountains present the old and new slate, separated by red and gray quartz rock and quartzose slate. Of quarry slate there are two principal varieties. The valleys belong to the limestone series, being an outlying prolongation of the great bed of the central plain. Lead, iron, and copper are found; and the copper-works have for many years been very productive. Marble of several colors and

of considerable beauty is quarried, and potter's clay of good quality is found.

Waterford is divided into 8 baronies, 82 parishes, and 1,557 town-lands. The most considerable towns besides Waterford (q.v.) are Dungarvan, Carrick-beg, and Lismore. Clonmel, though chiefly in Tipperary, lies partly within this county. This district, in common with the adjoining county Wexford, is believed to have been anciently peopled by a Belgic colony. The Danes also formed a settlement at the mouth of the Suir. From the date of the invasion, Waterford became a stronghold of the English, large grants having been made by Henry II. to the family of Le Poer; and in all the alternations of the subsequent struggle with the Irish population, it continued a firm centre of English influence. The county abounds with antiquities ecclesiastical and military, and of the Celtic and Danish as well as the Anglo-Norman period. Pop. (1901) 87,187.

WATERFORD: city and parliamentary borough of Ireland, cap. of the county of Waterford, but itself a county of a city; n. lat. 52° 16′; w. long. 7° 8′; on the river Suir, 12 m. from the sea; 97 m. s.s.w. from Dublin, with which it is connected by railways. The city, except an inconsiderable suburb (with which it is connected by a bridge of 39 arches, 852 ft. long, opening for the passage of ships), lies on the right bank of the Suir, along which a spacious quay extends nearly a mile, and from which the city ascends gradually in well-built streets. Vessels of 2,000 tons can discharge cargoes at the quay; but there is an anchorage for still larger ships about 6 m. lower down the river, at Passage. The chief trade is with Great Britain in the export of butter, pork, bacon, corn, flour, eggs, and live-stock. Steam-navigation has received great impulse, and there is a ship-building yard, with patent slip, graving-bank, and dock, on the Kilkenny bank of the river. Pop. 26,769.

WATERFORD: village in Saratoga co., N. Y.; on the Hudson river at the mouth of the Mohawk river, and on the Champlain canal and the Delaware and Hudson railroad; 2 m. above Cohoes and 10 m. n. of Albany. It has extensive water-power, and is a manufacturing village. The chief manufactories are knitting mills, foundry and machine shops, fire-engine shops, paper and flour mills, boiler works, and a furniture factory. In 1900 (government census) there were 58 manufacturing establishments, capitalized for $2,593,021. The raw material used annually cost $1,544,719, and the value of the finished products was $2,966,060. It has a Union Free School, public and parish elementary schools, free library, and one private bank. Pop. (1910) 3,245.

WATER GAP. See Delaware Water Gap.

WATER-GAS: a mixture of gases produced by the action of steam on incandescent carbon. The carbon first

decomposes the steam, forming hydrogen and carbon dioxide, and the latter gas then combines with more carbon to form the inflammable carbon monoxide. Thus water-gas is mainly a mixture of hydrogen and carbon monoxide. Pure water-gas is non-luminous, but it is rendered luminous by mixing with various gases obtained from petroleum, the luminous mixture being known as carburetted water-gas. Two chief methods are employed for the manufacture of water-gas for illuminating purposes. In the first of these, the Lowe process, the preparation of the pure gas and the carburetting are performed in one operation. The apparatus consists essentially of a generator, filled with anthracite or coke, in which the non-carburetted gas is produced; a carburetter, a circular chamber lined with firebrick and filled with a checker-work of the same material; and a superheater, a taller circular chamber similarly filled. By means of air-blasts and the producer-gas from the anthracite of the generator, the fire-bricks of the carburetter and the superheater are raised to a red heat, and then superheated steam is passed through the incandescent carbon. The water-gas formed passes over into the carburetter, where it becomes mixed with illuminant gases formed by the action of the heated bricks on mineral oil, which is introduced from above. This process is completed in the superheater, and the carburetted gas is then ready for purification. In the Wilkinson process the operations of making the gas and carburetting are separate. In the United States carburetted water-gas has largely replaced coal-gas as an illuminant, partly because of its brighter light and partly because it can be more cheaply manufactured in that country. Coal-gas is often mixed with carburetted water-gas in order to increase its illuminating power. The chief objection to the use of water-gas as an illuminant is the highly poisonous nature of one of its essential constituents, namely, carbon monoxide. Water-gas is also used in the non-carburetted condition as a fuel.

WATER GLASS: a substance which, when solid, resembles glass, but is slowly soluble in boiling water, although it remains unaffected by ordinary atmospheric changes. It consists of soluble silicates of potash or soda, or a mixture of both. A substance of this kind was first discovered, so far as is known, by Van Helmont in 1640. In the 19th century Dr. Johann Fuchs, of Munich, did much to improve the mode of preparing and applying it. Water-glass may be prepared in two ways, called wet and dry. The former mode of preparation consists in breaking down and calcining flint nodules, the fragments or particles of which are then added to a solution of caustic potash or soda, whereupon the whole is exposed for a time to intense heat at 60 pounds pressure. According to the latter method the constituents are fused together in the solid state and afterward dissolved. The product

when prepared in this way is viscid, and may be used in this state or further diluted. In this method of manufacture the caustic soda or potash may be replaced by the carbonate or the sulphate. Potash water glass is more soluble than soda water glass, and if both metals be present a still more soluble glass, called double soluble glass, is obtained. Among the purposes to which water glass is applied are painting on glass, coating stone, wood, and other materials to render them waterproof, glazing scenery, and paintings, etc. It is also used mixed with sand to make an artificial stone, and it forms an ingredient in some kinds of cement. One of the most valuable of its applications is in the fixing of wall-paintings, which are more durably fixed by means of it than by the ordinary process of fresco-painting.

WATER HAMMER: the name applied to a vessel partly filled with water, exhausted of air and hermetically sealed. When reversed or shaken, the water, being unimpeded by air, strikes the sides with a sound like that of a metal striking against glass.

WATER-HEMLOCK: deadly poisonous plants (*Cicuta*) of the carrot family, known also by many other names, such as beaver-poison, spotted parsley, muskrat-weed and musquash-root, the latter names being borrowed from the muskrat, which inhabits such swamps as the *Cicuta* affects; and the odor of the roots of certain species of the latter also recalls the musk-scented rodent. *Cicuta maculata* is a tall biennial, reaching 8 feet in height, with a rigid, hollow stem marked with purple lines, that grows in swamps and wet lands throughout the northeastern United States. The leaves are decompound, even three-pinnate, having coarsely serrate leaflets, with veins apparently ending in notches instead of at the points of the teeth, as in ordinary foliage. The flowers are very tiny and white, in decompound, terminal umbrels, with unequal pedicels. The fruits are ovate-oblong, glabrous, and slightly flattened latterly. The ribs are corky, the lateral ones being strongest. Spindle-shaped, tuberous roots cluster about the base of the stem, and are the cause of many deaths. They have an aromatic flavor, and fleshy substance, and are frequently mistaken, especially by children, for the roots of sweet-cicely, parsnips, artichokes, or even horse-radish, and are sometimes eaten for no particular reason except that they are fleshy and exposed by washouts, freezing, or digging-operations. Even live stock are killed, not only by feeding on the tubers themselves, but by drinking water poisoned by roots which have been crushed under the cattle's hoofs. The poisonous element in this *Cicuta* is an aromatic oily fluid, which permeates the whole plant, but is found chiefly in the roots, and probably contains the alkaloid conine, and the bitter principle cicutoxin. When eaten *Cicuta* produces vomit-

ing, colic, staggering and unconsciousness, and finally, frightful convulsions which end in death. No chemical antidote being known, the only treatment possible is to cleanse thoroughly the digestive system, and treat each stage of the attack, with such medicines as seem necessary. Cattle may sometimes be saved by timely and repeated doses of melted lard. The western water-hemlock (*Cicuta vagas*) has a fleshy root with a 'vertical root-stock, from 1 to 6 in. long by 1 to 2 in. thick, and is curiously divided into numerous chambers by horizontal partitions.' The root is filled with tubes from which an aromatic oil exudes. Solid fleshy fibres are sent out from this root-stock, near the surface of the soil. Very small pieces of the rhizome are fatal to men or cattle, many of the latter being killed each year by it. The elongated, spindling-roots of the Wyoming water-hemlock, *Cicuta occidentalis,* which in Montana is known as the wild parsnip, has a characteristic musky odor, and stock are poisoned either by the young plants or by the roots. Other species of *Cicuta* have a similar appearance above ground and are equally poisonous.

WATER-HEN, or Moor-hen: a rail (*Gallinula chloropus*), generally distributed throughout Europe, Asia, and Africa. Its length is about 13 in.; back, wings, rump, and tail rich dark olive-brown; head, neck, breast, and sides dark slate gray; thighs and flanks streaked with white, belly and vent grayish white; beak yellowish, becoming red; naked patch on forehead red; legs and toes greenish-yellow, claws dark-brown. The female is rather larger and more vividly colored than the male. They frequent ponds covered with aquatic herbage, overgrown water-courses, and the banks of slow rivers, swimming and diving with facility, assisted by an expansion of the membrane along the sides of the toes. The water-hen is representative of the sub-family *Gallinulinæ* of the rail family (*Rallidæ*) which comprises 30 or 40 species found in all parts of the world. In the United States they are generally known as gallinules (q.v.) or mud-hens, and are represented by the purple gallinule (*Ionornis martinica*) and the Florida or common gallinule (*Gallinula galcata*).

WATER-HICKORY. See Hickory.

WA'TERHOUSE, Benjamin, M.D.: physician and author: 1754, Mar. 4—1846, Oct. 2; b. Newport, R. I. He studied medicine in Newport, London, Edinburgh, and Leyden, graduating at Leyden 1780. In 1783 he helped to establish the Harvard Med. School, and 1783-1812 was prof. of medicine there; was also prof. of nat. hist. at Brown Univ. 1784-91, delivering at Providence the first course of lectures on that subject ever delivered in this country. In 1812 he resigned his professorship at Harvard, and from this time until 1825 was medical supervisor of military posts in New England. Water-

house was an early advocate of vaccination. He published several medical works and a novel.

WATER INCH: in hydraulics and irrigation, a measure of water equal to the quantity discharged in the 24 hours through a circular opening of 1 in. diameter leading from a reservoir under the least pressure, that is, when the water is only so high as to cover the orifice. This quantity is about 500 cu. ft.

WATERLAND, *waw'tėr-land*, DANIEL, D.D.: Anglican clergyman, prominent in the theological controversies of the first half of the 18th century: 1683, Feb. 17—1740, Dec. 23; b. Waseley, in Lincolnshire, of which parish his father was the rector. After the usual course of study at Magdalen College, Cambridge, he became rector of Ellingham 1713. George I. appointed him one of his chaplains 1717. About this time he engaged in theological controversy with Dr. Whitby; and 1719 he expanded his writings on this subject into his *Defence of Christ's Divinity*, a work sharply criticized by Arian writers. Waterland replied in a work published 1724. In 1721 he was appointed rector of the parish of St. Augustine in the City of London; 1724 chancellor of the cathedral of York; a canon of Windsor 1727; archdeacon of Middlesex 1728. With these he held the valuable living of Twickenham. During these years he was indefatigable in controversy, against the Arians, and against free-thinkers, such as Middleton and Tindal, and against those of the Anglican body who did not share his doctrines on the Trinity and the Eucharist. *A Critical History of the Athanasian Creed* (1724), *A Review of the Doctrine of the Eucharist* (1737), and *Scripture Vindicated* (1730), are noteworthy among his productions. A complete ed. of his works, with memoir of his life by Bp. Van Mildert, was pub. Oxford 1823, 10 vols. 8vo; vol. XI., 1328.

WATERLANDERS, *waw'tėr-lănd-ėrz:* in *chh. hist.*, a name given to the less rigid portion of the Mennonites, because the majority of them belonged to a district called Waterland, in N. Holland. They are almost exactly similar in their principles to the English Baptists. They are sometimes called Johannites, from Han de Rys, one of their leaders in the 16th century.

WA'TER-LILY: any plant of the genera *Nymphæa*, *Nuphar*, and *Nelumbium*, all of the nat. order *Nymphæaceæ* (q.v.); and often extended to all the plants of that order—e.g., the *Victoria regia*. Britain produces three species—*Nymphæa alba*, the White Water-lily; and *Nuphar luteum* and *Nuphar pumilum*, called Yellow Water-lilies. The two former are frequent in still waters; *Nuphar pumilum* is more rare, and is found chiefly in Scotland. All have heart-shaped leaves, floating on the water. The beautiful and fragrant white flowers of *Nymphæa alba* float upon the water; the flow-

ers of the yellow water-lily, of little beauty, are raised by their stalks a little above it. The seeds of these, as well as of the Water-lily of the Nile (*Nymphæa lotus:* see LOTUS), are farinaceous, and are sometimes used for food. The Turks prepare a cooling drink from the stems of *Nuphar luteum.*—The SWEET-SCENTED WATER-LILY of N. America, *Nymphæa odorata,* has a large white flower of great beauty and of very sweet smell: the flower varies to pinkish (bright pink at Barnstable, Mass.), the leaves often crimson beneath. *N. tuberosa,* N. Y. to Ill. and s., is scentless or with faint apple odor, and has numerous self-detaching tubers. Of the Yellow Pond-lily (*Nuphar*) there are several species, larger and smaller. *Nelumbium* has a large top-shaped receptacle, in which the nut-like seeds are contained in open cavities. See NELUMBO.—Not only *Nymphæa lotus,* but also *N. rubra* and *N. pubescens* are regarded as sacred plants by the Hindus. *N. cærulea* also was held sacred by the ancient Egyptians.

WATERLOO, Canada: (1) A town of Waterloo co., Ontario, 2 m. n.w. of the capital, Berlin, on a tributary of the Grand river, and on a branch line of the Grand Trunk railway to Elmira. It is an industrial centre, with iron foundries, manufactures of agricultural implements, textiles and tobacco, breweries, and distilleries. Pop. (1901) 3,537. (2) The capital of Shefford co., Quebec, and a railway junction, on the Stanstead, Shefford and Chambly railway, 70 m. e. by s. of Montreal. It has lumber and flour mills, a brewery, tanneries, and manufactures of mill-machinery, agricultural implements, iron castings, and furniture. Pop. (1901) 1,797.

WATERLOO: city, county-seat of Monroe co., Ill.; on the Mobile & Ohio railroad; about 20 m. s. of St. Louis, Mo. It is in a fertile agricultural region, in which the chief products are wheat and corn. In the vicinity are quarries of fine building stone, known in the trade as Waterloo marble. The chief manufacturing establishments are flour mills, marble works, a large brewery, an ice factory, and bottling works. There are large stock yards and coal and lumber yards. The educational institutions are a high school, founded in 1891, St. Joseph's School (R. C.), public and parish elementary schools, and a school library. The two banks have a combined capital of $35,000, and deposits amounting to $253,930. Pop. 2,000.

WATERLOO: town in De Kalb co., Ind.; on the Cedar creek, and on the Lake Shore and Michigan Southern railroad; about 25 m. n. of Fort Wayne. It is the commercial centre of an extensive agricultural section, in which wheat, corn, and vegetables are the chief products. It has seven churches, a high school, founded in 1872, graded elementary schools, and two banks. It was founded in 1857, and in 1864 was incorporated. Pop. 2,180.

WATERLOO: city, county-seat of Blackhawk co., Iowa; on the Cedar river, and on the Illinois Central, the Chicago, Rock Island and Pacific, and the Chicago, Great Western railroads; about 95 m. w. of Dubuque. It is in an agricultural and stock-raising region, and has considerable manufacturing interests. The chief manufacturing establishments are foundries, machine shops, gas-engine works, threshing-machine factories, and automobile works, and manufactories of refrigerators, manure spreader, and egg cases. The government census of 1900 gives the number of manufacturing establishments as 147, which were capitalized for $1,287,056. There were employed as wage earners 1,042, to whom were paid $471,608. The raw material used cost $1,555,578, and the annual products were valued at $2,499,361. The principal public buildings are the government building, the county court-house, municipal buildings, and the Presbyterian hospital. There are 31 church buildings. The educational institutions are two public high schools; the East High School, founded in 1872, and the West High School, in 1870; Our Lady of Victory Academy (R. C.), public and parish elementary schools, Waterloo Business College, and school libraries. The seven banks have a combined capital of $4,188,103 (Dec. 1903). The government is vested in a mayor and a council of eight members elected biennially. The majority of the inhabitants are American born; of the foreign born the Germans predominate, then the Irish, and the Scandinavians. Waterloo was settled in 1845-6 by G. W. Hanna and Charles Mullan. It was incorporated as a town in 1868. Pop. (1900) 12,580; (1910) 26,693.

WATERLOO: village, one of the county-seats of Seneca co., N. Y.; on the Seneca river, the Cayuga and Seneca canal, and on the New York Central and Hudson River railroad; about 18 m. w. of Auburn and 55 m. e. of Rochester. It is in an agricultural region, but the village has several manufactories, chief of which are large woolen mills, lumber mills, piano factories, wagon and carriage works. It has a high school founded in 1843, public elementary schools, and a public library. The two banks have a capital of $125,000, and deposits amounting to $434,270. Pop. (1910) 3,931.

WA'TERLOO, Stanley: American author and journalist: b. Saint Clair co., Mich., 1846, May 21. He was graduated from the University of Michigan in 1869, engaged in journalism, was one of the owners of the St. Louis *Journal* in 1872, was subsequently editor of the St. Louis *Republic*, *Chronicle*, and *Globe Democrat*, and in 1884 established the St. Paul *Day*. He was later editor-in-chief of the Chicago *Mail*, and has been engaged on various other journals. He has written: *A Man and a Woman* (1892); *Honest Money* (1895); *These are My Jewels* (1902); *An Odd Situation; The Story of a Strange Career* (1902); *The Cassowary* (1906); etc.

WATERLOO', Battle of: decisive conflict which annihilated the power of Napoleon I., 1815, June 18, in a plain about 2 m. from the village of W., in Belgium, 12 m. s. of Brussels. The Allies having resolved to attack Napoleon on all sides, and crush him as they had done in 1814, Brit. and Prussian troops were stationed in the Netherlands, under Wellington and Blücher respectively, to attack France on the n. Napoleon, aware that for a considerable time no weighty attack could be made on France except by these forces, and recognizing the advantage of destroying one enemy before the others could come up, rapidly concentrated the bulk of his troops; and, with a suddenness and secrecy which defied all effective counter-preparations, crossed the Belgian frontier, and fell with a part of his forces on the Prussians at Ligny (q.v.), and with the other part, under Ney's immediate command, on the army of the Prince of Orange at Quatre-Bras (q.v.). The Prussians—as Wellington, after learning Blücher's dispositions for the battle, had foretold—were completely defeated, after a very obstinate contest; but the Prince of Orange, by the aid of the reinforcements promptly forwarded by Wellington, succeeded in withstanding Ney's attack. In the plan of the Allied generals such a result was not unforeseen, and in accordance with their scheme of firm resistance, and retreat if necessary (to allow time for the Russians and Austrians to assemble on the e. frontier of France), Blücher retreated n. (instead of e., as Napoleon expected), nearer the place of rendezvous with Wellington at Mont St. Jean; while early on the morning of the 17th the Anglo-Netherlanders retired along an almost parallel route till they reached the forest of Soignies, in front of which they were formed, facing s., in battle-array. Napoleon, imagining that the Prussians were in total route, and that their complete dispersion would easily be accomplished by Grouchy's division (33,000 men), which he had sent in pursuit, crossed to Quatre-Bras with the rest of his troops, and, uniting with Ney, marched in pursuit of Wellington, arriving on the plain of W. in the evening.

The two armies which then confronted each other, though nearly equal in strength, were composed of very different materials. The French army, numbering from 69,909 to 72,247 men (according to French authorities), was composed of veteran troops, who had enthusiastically ranked themselves once more under the standard of the chief who had so often led them to victory. The Anglo-Netherlands army, which numbered 69,894, of whom only 25,389 were British, 6,793 of the king's German legion, 10,995 Hanoverians, 6,303 Brunswickers, 2,926 Nassauers, and 17,488 Netherlanders, consisted, with the exception of a small number of Peninsular veterans, wholly of young soldiers, a large proportion of whom had never been under fire; the Hanoverians were only militia, some of them being fit for garrison-duty only; while the behavior of many of the Belgian troops during the battle showed plainly that they merely increased the *numerical* strength of the army

without adding to its fighting strength, as they left it to the Dutch soldiers to vindicate the wrongs of the Netherlands. The French had 240 guns, while their opponents had only about 156 guns. With such an army, to maintain even a defensive conflict with an army of veterans, commanded by the greatest general of the time, was a task which required all Wellington's rare tenacity of purpose to undertake; yet undertake it he did, depending on Blücher's promise to join him an hour after midday.

On the morning of the 18th the two armies found themselves ranged in battle-array: the Allies, posted on a line of eminences, had their left wing resting on Frischermont the farm-house of La Haye Sainte in front of their centre, while their right wing curved convexly round behind Hougomont, and rested on Braine Merbes. The French were ranged on a parallel row of eminences, having La Belle Alliance in their centre, with some divisions of cavalry and infantry in reserve behind the right wing, Kellermann's dragoons behind the left wing; and the Guard, stationed with the 6th corps, in the rear. Skirmishing had continued all the morning; but the first serious attack was made between 11 and 12 A.M., when a part of the 1st corps advanced against Hougomont, with the view of masking the more important attack to be made against the Allied left. This preliminary assault, however, though unsuccessful, was maintained with great vigor for a considerable time; till Napoleon, dreading further loss of time, prepared to make his grand attack on the left centre. At this time (1:30 P.M.) he learned that the advanced guard of the 4th Prussian corps (Bülow's) was appearing in front of St. Lambert, 2–3 m. to his right; and being forced to detach his 6th corps (Lobau's) with the reserves of cavalry behind his right wing, to keep them in check, he had to modify his grand plan of attack, and ordered Ney to break through their centre. At 2 P.M., after a furious preliminary cannonade, from which Wellington sheltered his men (as at various other times during the battle) by retiring them to the reverse of the slope, Ney advanced against the left centre with 20,000 men, but had succeeded only in putting to flight a Belgian brigade when he was attacked and driven back by Picton's division, his retreating columns charged and broken by the Brit. cavalry, and 2,000 prisoners taken. Nevertheless Ney soon returned to the charge, and carried La Haye Sainte, though his repeated attacks on the infantry in position were constantly repulsed, and his retreating columns severely handled by the Brit. cavalry, who, disordered by success, were as often overthrown by the French cuirassiers. By this time (4:30 P.M.) Bülow had succeeded in deploying from the woods; and, advancing against Planchenoit, in the rear of the French right, carried it after a vigorous conflict. Lobau's corps, however, aided by a reinforcement from the Guard, speedily retook the post, and, driving the Prussians back into the wood, secured the French right flank for a time. Another Prussian corps (the 1st, under Ziethen) was coming up by Ohain to join the Allied left; but Napoleon was

still confident that he could destroy the Anglo-Netherlanders before the Prussians could render effective aid. During the conflict with Bülow, Ney had been warmly engaged with the centre and right of the enemy, who had made various attempts to regain the wood of Hougomont and La Haye Sainte; and Ney had supported his repeated attacks with not only his own cavalry, but with the cuirassiers, lancers, and chasseurs of the Guard, and the whole of the mounted reserve, without, however, producing any result other than great slaughter on both sides, and the useless sacrifice of 18,000 of the finest cavalry ever seen. Napoleon now resolved on another vehement assault on the immovable British centre, and directed against it in succession two columns, one composed of four battalions of the Middle Guard, and the other of four battalions of the Middle and two of the Old Guard, supporting them with flank attacks of other infantry divisions, of cavalry, and with a dreadful fire of artillery. The advancing French were met with a well-sustained fire from every piece which could be brought to bear on them; the first attacking column was fairly driven down the slope by the Brit. Guards, and the second was totally routed by a bayonet-charge of Adams's brigade, the Brit. cavalry following up the fugitives. Ziethen had now (7 P.M.) joined the left of the Brit. line; Bülow, further reinforced, had carried Planchenoit, and was driving the French right wing before him; and the combined attack on the retiring masses of the French by the whole effective force of the Anglo-Netherlanders on the one side, and of the Prussian cavalry on the other, converted an ordinary though severe defeat into a rout unparalleled in history. The magnificent cavalry, uselessly destroyed by Ney in fruitless attacks on an 'impracticable' infantry, would then have been of incalculable service, but they were no longer to be had. The last square of the Guard still stood its ground, to protect the flight of the emperor; but it was speedily surrounded, and, on the soldier-like refusal of Cambronne to surrender, was in a moment pierced through and broken to pieces. From this time all resistance was over; the roads southward, especially that to Genappes, were crowded with fugitives fleeing for their lives from the pursuing cavalry; and though the Brit. light cavalry, exhausted with their severe work during the battle, soon ceased the pursuit, it was kept up with great energy through the whole night by Blücher's Prussian troopers, who had made their appearance on the field in time to complete the victory, and who seemed bent on at once avenging the defeats of Jena, Auerstadt, and Ligny. The total loss in this battle was, from the obstinacy and determination with which it was contested, necessarily large; the figures are: British and Hanoverians 11,678; Brunswickers 687; Nassauers 643; Netherlanders 3,178.—total 16,186, which, added to 6,999 Prussians, gives the aggregate allied loss 23,185. The French lost, as reported, 18,500 killed and wounded, 7,800 prisoners (the total loss was probably more than 30,000—some French accounts

raise the total list of *hors de combat* to 32,000), and 227 cannon captured.

There have been many unprofitable controversies among the British, French, and German historians concerning many points in this great battle. We note here, as evident, three faults of Napoleon—not, however, as assuming them to have been actually decisive of the result: (1) the late hour at which he began his attack, due to his not calculating on the ability of the Prussians to arrive on the field at all in the course of the day; (2) his at least 'tacit consent' to the frightful waste of his splendid cavalry reserve before 4 P.M.; (3) his neglect to take into account (though warned of it by Soult) the steadiness with which the British infantry were always wont to hold their ground under assault.—Each of the three nations claims its right to give name to this famous conflict—the French calling it after *Mont St. Jean,* a chateau in rear of the British line; the Prussians after *La Belle Alliance;* while the true victors call it the *Battle of Waterloo.*—See Col. Chesney's *Waterloo Lectures* (1868).

WATER MARK: (1) The mark or limit of the rise of a flood or the mark indicating the rise and fall of the tide. (2) In paper-making, any distinguishing device or devices indelibly stamped in the substance of a sheet of paper while yet in a damp or pulpy condition. The water marks used by the earlier paper-makers have given names to several of the present standard sizes of paper, as pot, foolscap, crown, elephant, fan, post.

WATER METERS: instruments by which the quantity of water or any other liquid flowing through pipes is measured and recorded automatically. They are of three general types—the 'positive,' the 'inferential,' and the 'proportional' meters.

Positive meters measure the actual volume of the water, by the action of a piston working in a cylinder which is successively emptied and filled at the completion of each stroke. The cylinder being of known dimensions affords a measure of the quantity of water introduced in a given interval of time. The pistons are either reciprocating or rotary, or of the oscillating or gyrating disk pattern, and they may be single or double. When single, a weight or spring produces the return stroke, but in the case of the double arrangement, the reciprocal action of the two pistons is controlled by the action of each other, as in the case of a duplex pump. In rotary piston meters, which may also be of the single or double type, the pistons have interlocking faces and revolve in an air-tight chamber. Upon the outer surfaces of the pistons are a series of projections and recesses which correspond to similar shapes on the inner walls of the cylinder. The pressure of the flowing water causes the piston to revolve so that a series of recesses or chambers

in the cylinder are successively filled and discharged from the inlet to the outlet of the meter. When oscillating or gyrating disks are employed in the place of pistons, the wabbling motion of the disks alternately empties and fills the cylinder. Inferential meters measure the velocity of the flowing water by recording the revolutions of a turbine or other water-wheel attachment, and the quantity is deduced by computation from that record. Proportional meters measure a fractional part of the full flow and are therefore capable of being set on a small by-pass pipe which branches from and subsequently rejoins the main pipe, but their use is quite limited.

The registering mechanisms consists of a series of cog-wheels and dials. The flow of the water actuates the cog-wheels, and the number of revolutions are recorded on the dials. The arrangement of the mechanism converts the number of revolutions into any desired unit of volume, so that the reading of the dials is termed straight and gives the quantity direct, in cubic feet, the unit generally adopted, particularly in the United States.

The working parts of meters are made light and durable. Serviceability and accuracy are the qualities required, and in their design the support of the water pressure is employed to reduce to a minimum the loss of head, and the wear and tear of the working parts, and although a high degree of accuracy is not generally required, the meters are made sufficiently sensitive to measure the small flows incident to leakage. Hard rubber is generally used for the disks, and also for the rotary pistons of some meters, but where the liquids are hot, or consist of chemical solutions, brass is generally employed. Possible damage due to clogging by the introduction of fish or gravel, is prevented by various forms of strainers and sieves, while effect of frost is guarded against by frost cases.

There are several forms of meters which do not come under the general classes already described. Of these the 'Venturi,' constructed by Clemens Herschel, of New York, in 1886, is the superior and most useful on account of its simplicity and durability. Its basic principles—the relation between the reduction of pressure and the increase of velocity of water flowing through a contracted pipe, was discovered by Venturi in 1796. In construction it consists of two conical shaped pipes with their smaller ends joined together by a collar or throat-piece, resulting in a shape similar to a pipe contracted at one point of its length. By gauging the pressure of the water at a point just before, and also directly at the point of contraction, and the relation of these pressures to the diameter of the pipe, the volume of the flow is computed. The tubes are usually constructed of cast iron or riveted steel, but they may also be constructed of masonry or wood. The length of the meter varies from

8 to 16 times the diameter of the uncontracted portion, while the diameter of the contraction ranges from one-fourth to one-half of the full diameter of the tube. They are made in sizes varying from 2 to 94½ inches, with practically no limit to the possible maximum size, but for practical use where meters of diameters less than six inches are required those with moving parts are cheaper. Waste-water meters are employed in connection with water works to measure the rate of consumption per unit of time, instead of the total volume. They consist usually of a disk placed horizontally in a cone-shaped chamber. The disk is lifted or lowered according to the greater or lesser volume of water passing through the pipe in which it is set, and being connected by a wire with a counter weight and pencil which follow the movements of the disk, records the nature and amount of those movements on a paper carried by a drum which is revolved by clock-work. The vertical rulings of the record sheet indicate the time intervals, while the horizontal lines represent the units of volume. Since all the water consumed in a given district must pass through such a meter, by comparing the rates of consumption of the various districts, the causes of abnormal waste are readily determined and localized.

Another form of water meters, more particularly known as current meters, are employed in hydraulic engineering to measure the velocity and volume of flow of the waters in rivers, large aqueducts, and sewers.

WATER-MOCCASIN: a snake. See MOCCASIN.

WATER MOTOR: in its broadest sense the term is applicable to all forms of machines or systems of machinery operated by water under the force of gravity, or in other words, by which the energy inherent in a natural waterfall is utilized to perform mechanical work. Of these machines, the water-wheel (q.v.), the turbine (q.v.) and the pump (q.v.), have been treated under their respective titles, but in this article the term will be considered as designating those machines which are operated by the element of pressure only, such as hydraulic lifts and water-pressure engines.

The Hydraulic Lift is the simplest of all water motors. The direct-acting lift consists of a cylinder in which a ram or piston of equal length, with a cage attached to its upper end, works up and down. The level of the water supply is necessarily above that of the maximum height to which the cage may be lifted, so that when the water is admitted to the cylinder through its lower end, the pressure forces the ram upward and thus lifts the cage. The descent of the ram is accomplished by closing the supply valve and opening the discharge valve, the ram descending by its own weight. As the weight of the ram is greater than necessary to bring down the cage, a part of that weight is balanced by a weight at-

tached to the end of a chain that works over a pulley at the top of the lift and is connected to the cage. The most familiar examples are the high-speed hydraulic passenger elevators. They are operated by the pressure of water pumped into tanks situated on the roofs of the buildings in which they are installed, while the operating machinery is located in the basement. The hydraulic press and the hydraulic ram are devices operated practically under similar principles. In the former, the action depends upon the principle of hydrostatics that a pressure applied to any part of the surface of a liquid is transmitted in all directions, and throughout the mass without diminution. For example, if a cylinder filled with water has a plunger one inch square working through one end, and another ten inches square working through the other end, and a pressure of one pound is exerted on the smaller plunger, this pressure will be transmitted to the larger plunger, and be delivered by the latter in a multiplied amount equal to the square of its face area expressed in pounds. In this example that pressure would be 100 pounds. Such presses consist essentially of two cylinders connected by piping. The pressure is applied to the plunger of the smaller cylinder, and the multiplied pressure is transmitted by that of the larger to the object to be raised or pressed. In construction they vary greatly with the purposes for which they are employed. Those used as hay, cotton and oil presses, consist of four strong iron pillars arranged in the form of a square, which carry a cast-iron plate solidly attached to their tops. A similar casting is situated at the bottom of the pillars. Through a circular hole in the centre of the lower plate, a plunger carrying a square platen on its head, works with an upward motion and presses the material placed between the platen and the under face of the top plate. In presses used for hydraulic forging, the cylinder and plunger are carried by the top plate, while the bottom plate carries the anvil. The plungers work downward in the act of pressing or hammering. They are made of various sizes, and are generally provided with two pressure plungers and cylinders, and they are adapted for purposes varying from the manufacture of revolver cartridge cases to the forging of armor plate, guns, and steamship shafts. Armor plate presses capable of exerting a pressure of 14,000 tons are in use, while 7,000-ton fluid compressors are employed in many of the larger steel manufacturing plants. A brief description of the construction and working of one of the last-named capacity will serve to illustrate the mammoth proportions and enormous power of these machines. It consists of an upper head weighing 120 tons carrying the plunger, and a 135-ton base plate containing the hydraulic cylinder. These are supported and held in place by four vertical connecting columns each 50 feet long, and 19 inches in diameter. In operation, the molten metal is

poured into a mold built up in sections, and the mold is raised under a hydraulic pressure of 7,000 tons, while a plunger attached to the upper head bears down upon the fluid metal and compresses it.

Hydraulic Ram.—In the hydraulic ram the force of water flowing by gravity is utilized to raise a portion of itself to a height above that of the source of supply. Two pipes are employed. The water in flowing through the main or drive pipe acquires sufficient momentum to close a valve at the foot of the pipe, and the water thus confined automatically opens another valve, partially fills an air chamber situated over the foot of the main pipe, and compresses the air in it until the pressure within balances the column of water in the main pipe. Then, the foot valve of the main pipe opens again and the action described is repeated. In the meantime, the pressure in the air chamber forces the water through a small service pipe, leading out of its bottom, to the required height.

Hydraulic Engines.—In the hydraulic lifts or elevators, the admission and discharge valves are worked by hand at the will of the operator, but in the engines the mechanism actuates the valves automatically and periodically, thus converting the lift into a machine with a continuous action. Unlike the vertical water wheels and turbines, the efficiency of which depends upon the weight of a large body of water falling from a comparatively small height, the water engines work under the pressure of a small column of water descending from a considerable elevation. They are of three types—the 'single action,' in which a piston working in a cylinder is moved upward by the pressure of the water, and downward by the weight of the piston itself; the 'double action,' in which the cylinder is closed at the top as well as at the bottom, and the water admitted to it by supply pipes at those points, acts reciprocally on the piston from above and below; and the 'rotary,' in which the water pressure acts on a revolving piston similar to that of a rotary steam-engine. Rotary engines may be of the single-acting or double-acting type, the advantage being with the former, since the pressure of the piston is always exerted on the crank pin in one direction, and the dead centres are passed without knocking. Generally three single-acting cylinders formed in one casting are used in connection with a disk valve with segmental posts which pass over corresponding apertures in the valve seating during rotation, and the engine will readily start in all positions. The first engine of this kind was constructed by Sir William Armstrong, who also subsequently designed one of the reciprocating pattern. Since then a great variety of hydraulic engines have been invented, the greater number of them being of the last-named type. They have a wide field of usefulness, especially as auxiliary motors for driving small machinery such as hoists,

swing-bridges, capstans, cranes, winches, etc. The employment of superheated water motors is one of the latest developments in the methods for railroad traction. In the earlier forms of engines operated by superheated water, the storage tank being charged with water at a temperature corresponding to several hundred pounds of pressure; the steam from the water was utilized in the cylinders of the motor in a manner similar to the utilization of steam from the boiler of a locomotive engine by expansion in its cylinders. Their operation was based upon the relation of temperature and pressure to the vaporization of liquids, and the steam was drawn off from its point of formation at the top of the storage tank to the cylinders. Under these conditions, new steam was supplied by water which boiled at lower and lower pressures and reduced temperatures, until the pressure fell to a point at which it was not available for use in the motor, and only about one-ninth of the energy of the heated water was actually used in the cylinders. About 1888 W. E. Prall, of Washington, D. C., suggested the utilization of the heat in the storage tank by withdrawing it in the form of water from the bottom of the tank instead of steam from the top, and allowing the water thus withdrawn to give up its heat within the cylinders of the engine itself. In the latest motors, this is accomplished by a generator composed of a nest of tubes coupled into manifolds at the top and bottom. The working pressure is about 700 pounds to the square inch, and the water is drawn off from the generator into three insulated storage tanks with a total capacity of 7,000 pounds, carried beneath the car. From the bottom of the tanks the water is delivered through three Tappet valves provided with screw and nut adjustment, to regulate the amount of feed. In operation, under the decreasing pressure caused by the movement of the piston through its stroke, the water resolves into steam in a continual series of flashes, while the steam and the unevaporated portion of the water from the high-pressure cylinders, pass out through the ports in its bottom, and is drained off through valves located in the lower face of the valve chest. The exhaust steam from the high-pressure cylinder passes in the ordinary way to the low-pressure cylinder, from which it is finally exhausted, into the atmosphere. It is estimated, that a car equipped with two compound engines and three tanks charged with water at a pressure of 700 pounds to the square inch, and a corresponding temperature of 500°, will be capable of running 40 miles at a speed of from 30 to 40 miles an hour.

Bibliography.—For specific and detailed information consult the various engineering magazines; also Bodmer, *Hydraulic Motors, Turbines and Pressure Engines* (1899); Weisbach, *Mechanics of Engineering, and Hydraulics and Hydraulic Motors* (1877).

WA'TER-POWER: pressure of water used as a prime mover of machinery. The value of W.-P. depends much on the nature of the source of supply, whether steady or otherwise. Where streams supplying W.-P. are liable to great decrease in dry weather, large impounding reservoirs are necessary. On small streams there is generally a pond provided; but on large rivers there is, in general, only a weir or dam across the river to direct the water into the intake lade. The rise and fall of the tide also is used for driving water-wheels.

The most usual, and generally the most eligible, mode of applying water to driving of machinery is by means of a vertical wheel put in motion either by the water acting on blades or floats by impulse derived from its velocity acquired in falling, or by the weight of water being applied to one side of the wheel. The first mode of applying the water is generally applied in low falls, say under 6 ft., and to what is called an undershot wheel—i.e., a wheel where the effective head of water is below the level of the centre; and to make the application efficient, that portion of the periphery of the wheel measuring from the point of impact of the water to a point directly below the centre requires to be surrounded by a casing, generally of stone, but sometimes of cast-iron, called the arc, closely fitted to the extremity of the floats, so as to prevent any considerable escape of water.

The wheel, which may be either of timber or of cast-iron, or partly of both, consists (fig. 1) of axle, *a;* arms, *b;*

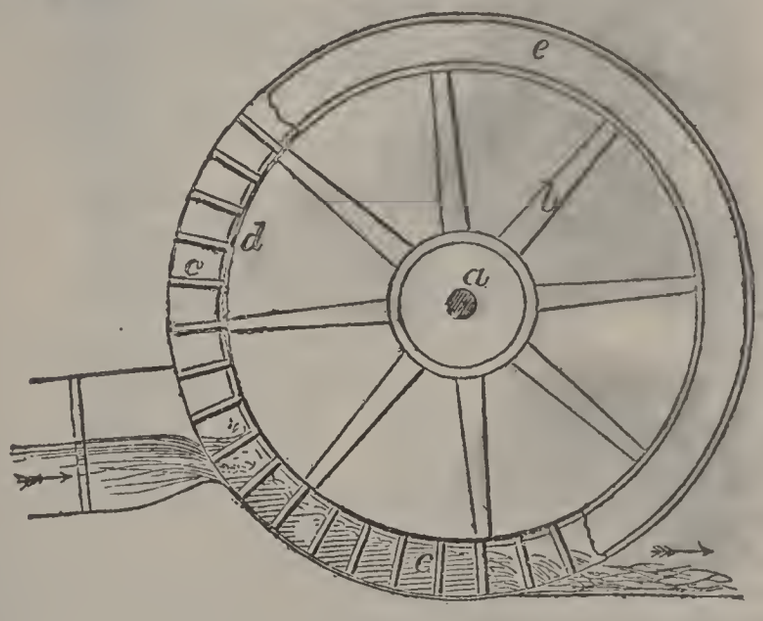


Fig. 1.

floats, which are generally radii of the circle, but are sometimes set a little obliquely to the radius, pointing up-stream, *c;* and generally there are also a sole, *d*, being a lining round the circumference at the lower edge of the floats, having openings for the escape of air; and a shrouding or circular plate, *e*, at each side of the wheel, and of the same depth as the floats. Sometimes, when there is very little fall beyond the mere current of the stream, the floats sim-

ply dip into the water like the paddles of a steamboat, in which case no sole or shrouding is required; and to make allowance for the rise of the water in the tail lade during floods, which is generally called *back-water*, and seriously impedes and sometimes stops the motion of the wheel, occasionally the wheel and its arc are so constructed as to be capable of being raised or depressed together, without throwing the machinery out of gear. Sometimes all the machinery is on board a vessel moored in a river, so as to rise and fall with the level of the water, and thereby keep its water-wheel always immersed to the proper depth. At the old London Bridge water-works the wheels which rose and fell with the tide were worked by the current of both the flood and the ebb.

The other mode of applying the water to a vertical wheel, by making it act by its gravity, is the more perfect and eco-

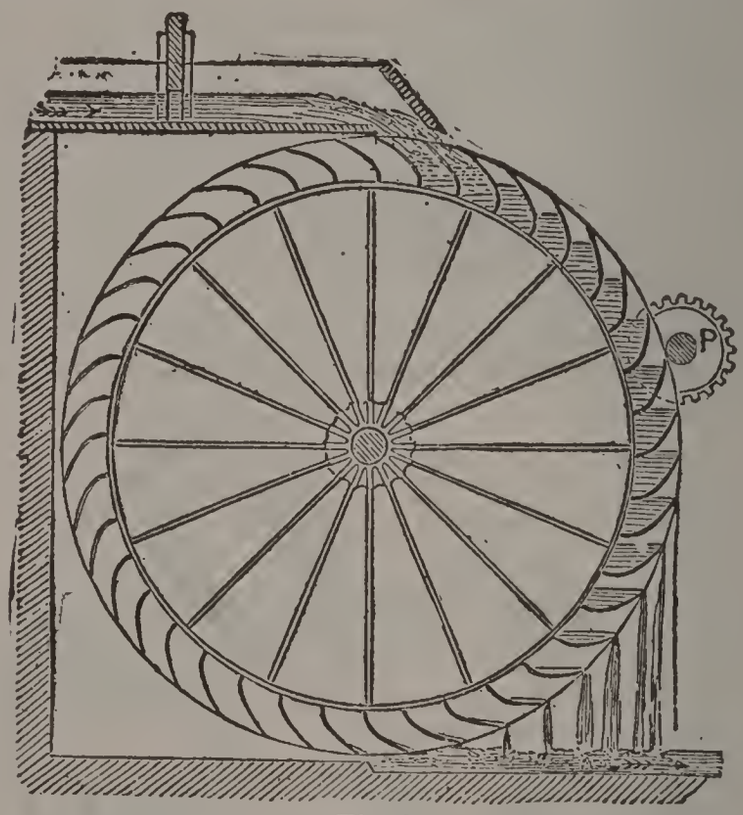


Fig. 2.

nomical mode where circumstances will admit, and is generally adopted in falls of any considerable height, say of 6 ft. and more, and where the water can be let on above the level of the centre. The wheels are called respectively *breast* and *overshot wheels*, according as the water is let on nearer the level of the centre than the crown of the wheel, or nearer the crown than the level of the centre of the wheel; and instead of floats they have curved or kneed buckets of such shape as to retain the water down to the lowest possible point. There are generally in good wheels ventilating openings in the sole for escape of air. The overshot wheel has this disadvantage, that, as the water has little or no power until considerably past the top centre, the wheel is burdened with a useless weight of water.

The direct overshot wheel has the water run, without changing its direction, right over the top, as in fig. 2; which arrangement has this advantage, that, as the top of the wheel moves in the same direction as the stream, it gets the benefit of the whole initial velocity and impulse of the water; but, on the other hand, the bottom of the wheel, if at all immersed in water, which it generally is to some extent, meets with obstruction by moving against the current.

The *pitch-back overshot* is a modification of the preceding making the water to pass alongside the wheel, and then to

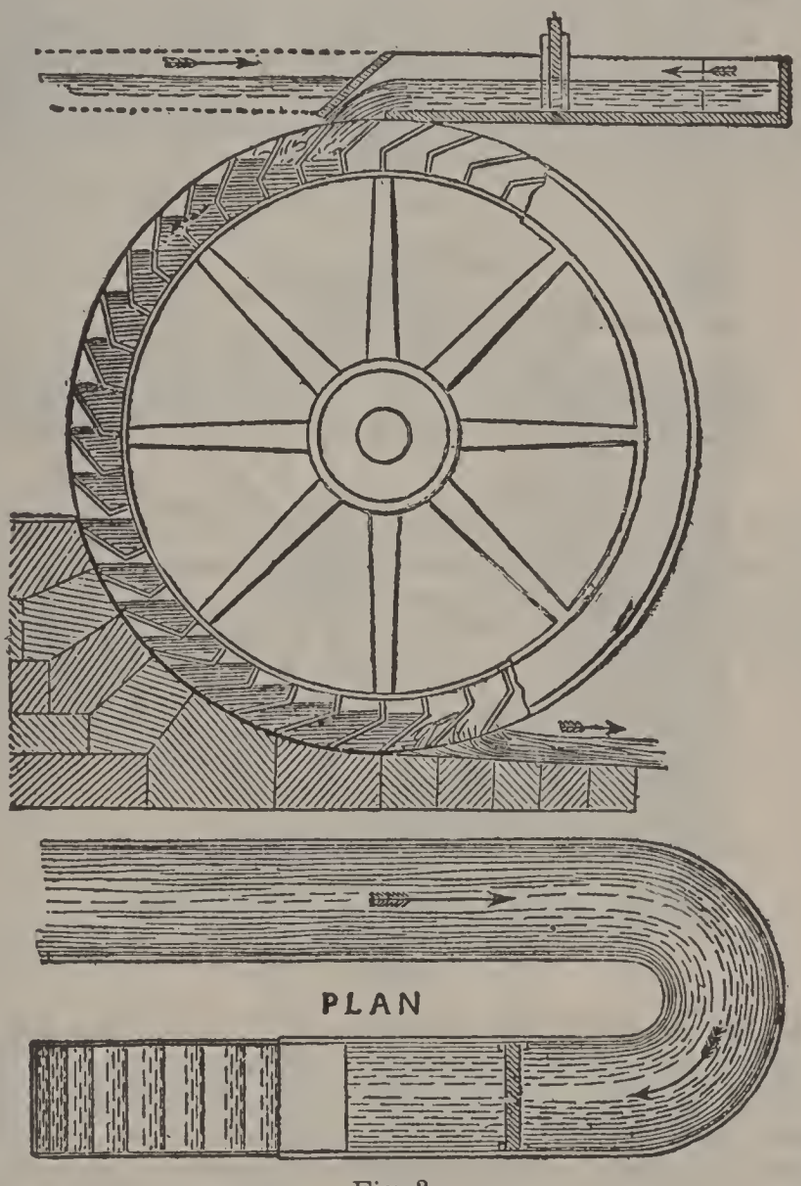


Fig. 3.

return and be let on the top of the wheel in a contrary direction, as in fig. 3. This requires longer and more complicated troughs, and by the change in direction part of the impulse from the water is lost; but the bottom of the wheel moves in the direction of the tail-water, and is not liable to be impeded by being immersed in it.

On the whole, it is generally thought better to apply the water at about 30 degrees from the top of the wheel. In such high-breast or nearly overshot wheels the water is let on to the buckets over the top of the sluice, which is made

to open by lowering and shut by lifting, as in fig. 4. In this way, however small may be the quantity of water, it is always applied at the highest possible level, which is important when it is its weight multiplied by the height of descent, and not its impulse, that yields the effective power.

The structure of the overshot and breast wheel is nearly the same as that of the undershot, except in the substitution of curved buckets, as in figs 2 and 4, or angular buckets, as in fig. 3, for straight floats; but even in the undershot wheel the floats are sometimes made with a slight curvature.

In any kind of wheel the motion may be taken off the axle by torsion, which necessarily requires rigidity in the arms, as in figs. 1 and 3; or it may be taken directly off the periphery, when the power is applied to a pinion P, working into segments either external, as in fig. 2, or internal, as in fig. 4, attached to the shrouding. In this arrange

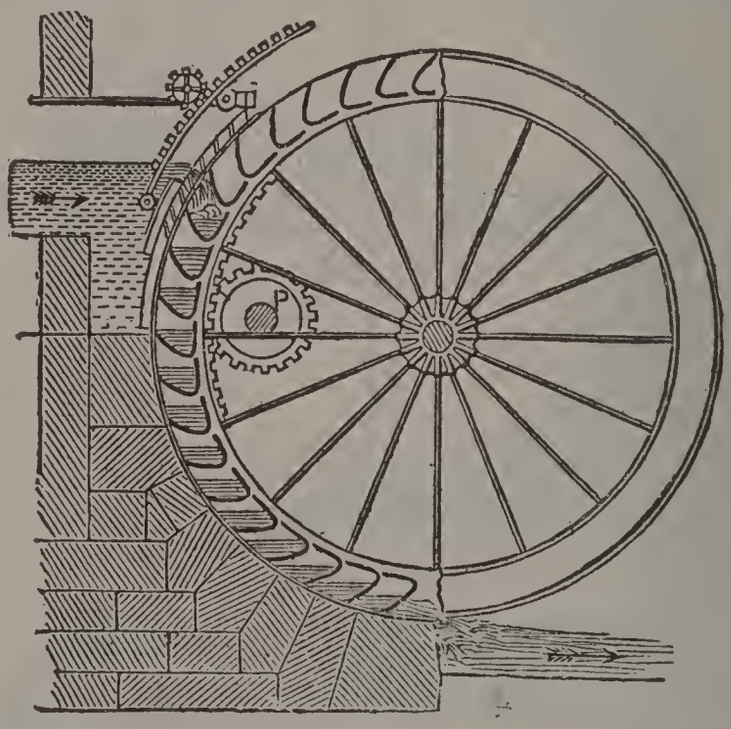


Fig. 4.

ment there is no torsion of the axle or transverse strain on the arms; therefore the latter are more often made of round wrought-iron rods, with a slight axle. This wheel is much lighter than with the massive axle and the strong wooden or cast-iron arms, and is called a *suspension* or *spider wheel.*

The weight of water being 62½ lbs. to a cubic ft., 528 ft., falling vertically 1 ft a minute, would be equal theoretically to 1 Boulton and Watt horse-power of 33,000 lbs lifted 1 ft. a minute; but the effective power is far short of that, and 60 per cent. of it, requiring 880 cubic ft., falling 1 ft. a minute, is generally reckoned a fair allowance for an effective horse-power. Seventy-five per cent., requiring 704 ft., falling 1 ft. a minute, is about the highest that has ever been spoken of, and it is doubtful whether more than 70 per cent. has ever been attained: while with low falls and imperfectly constructed wheels it is often reckoned that a

horse-power requires nearly 1,000 cubic ft. a minute. The velocity of the periphery of an undershot wheel is usually 500 to 600 ft. a minute, and that of a bucket-wheel, overshot or breast, from 300 to 450 ft. It is seldom that

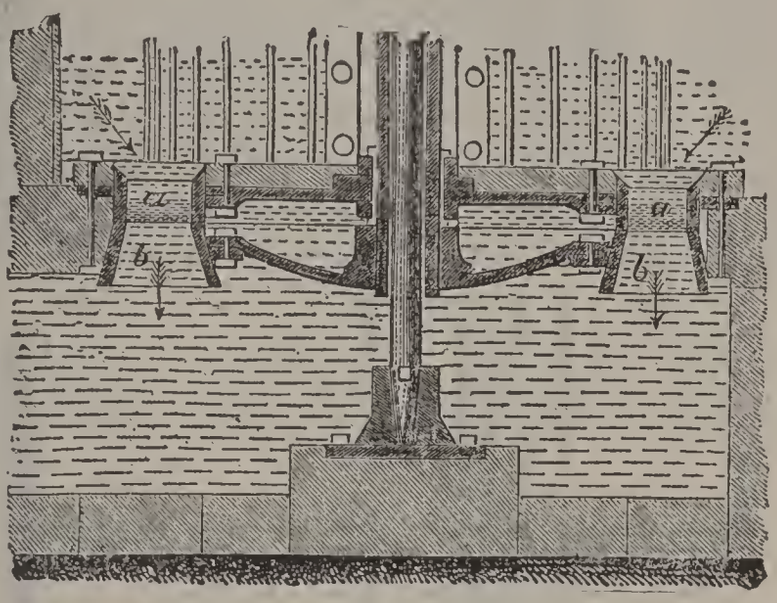


Fig. 5.

the whole height of a fall can be advantageously taken into use; for if the wheel be placed so low as to get the benefit of the whole height of the fall in low states of the water, very often it is liable, in floods, to have the lower rim immersed, and to be obstructed or stopped by back-water.

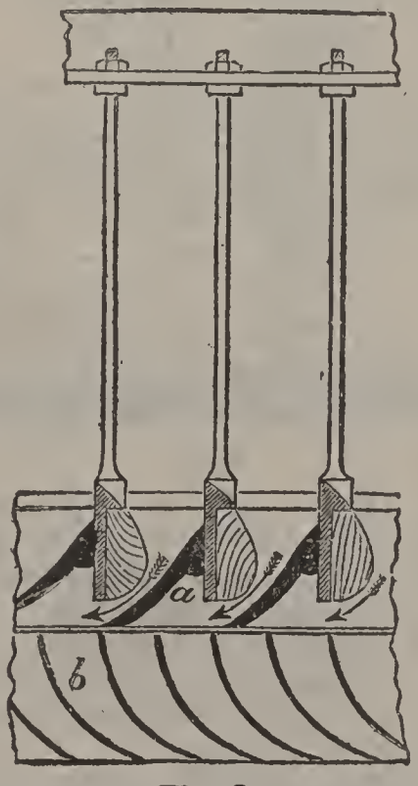


Fig. 6.

A noteworthy application of water-power is that of the Shaws Water-works, now the property of the corporation of Greenock: there the yield of nearly 7,000 acres of hill

ground is stored up in reservoirs of a capacity of 320,000,000 of cubic ft., and conveyed by an aqueduct about 6 m in length to the outskirts of Greenock, which it reaches at the height of 512 ft. above sea-level, and is then divided into two lines of falls, one having 1,200 cubic ft. a minute for 12 hours a day, and the other the equivalent quantity of 1,066 ft. for 13½ hours a day, divided each into 19 falls. One ft. of fall for each line is reckoned 1·8 horse-power, which is a very high computation, being 79·2 per cent. of the theoretical horse-power. At the 'Cotton Mill,' where both lines of falls are combined, there is what was for many years the largest water-wheel in existence, 70 ft.

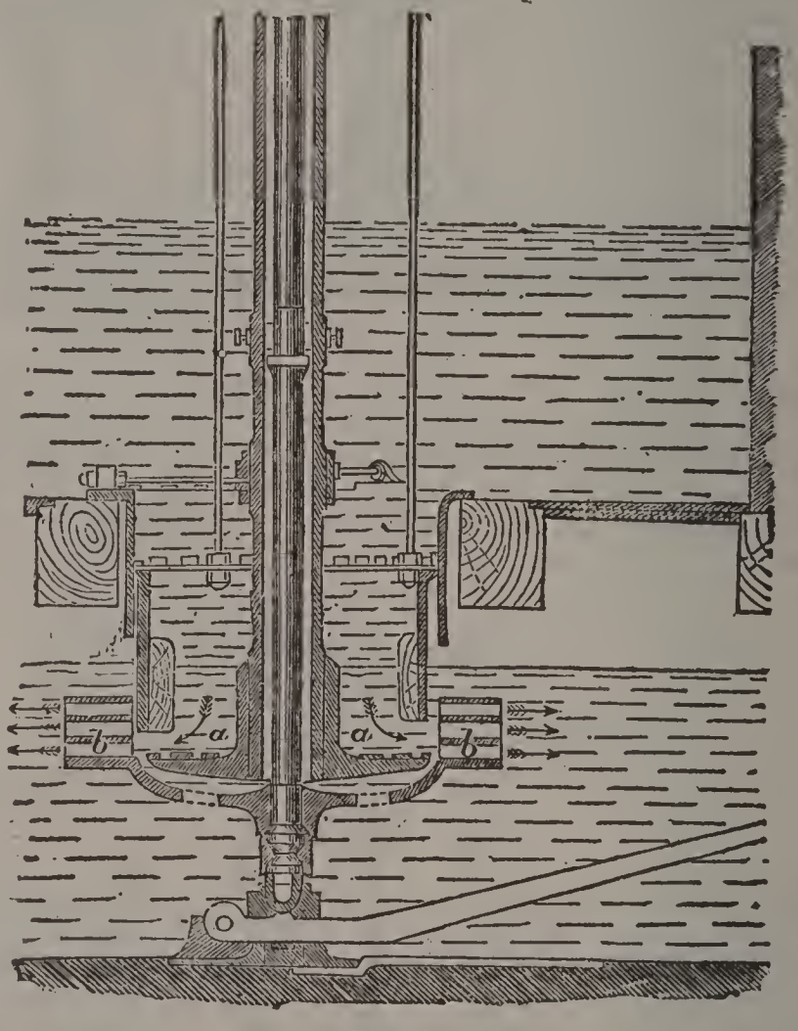


Fig. 7.

2 in. in diameter, 13 ft. wide, with 166 buckets, having a depth of 17 in. It has 2,266 cubic ft. of water per minute, with a fall of 64 ft. 4 in., and is therefore nearly 200 horse-power. By the Shaws computation, it would be 218 horse-power. It is a spider-wheel, taking the power off the circumference. At Laxey, in the Isle of Man, there is a water-wheel 72 ft. 6 in. in diameter, used to pump water from a lead and silver mine.

Horizontal Wheels.—In the proper turbine [from It. *turbino*, a whirlwind], the water passes either, first, vertically down through the wheel between fixed screw-blades, which give it a spiral motion, and then strikes similar blades attached to a movable spindle, but placed in the

opposite direction, so that the impact of the water communicates a rotatory motion to the blades and spindle, as

Fig. 8.

shown in fig. 5, and in fig. 6 an enlargement of the parts, the fixed blades being marked *a*, *a*, and the movable por-

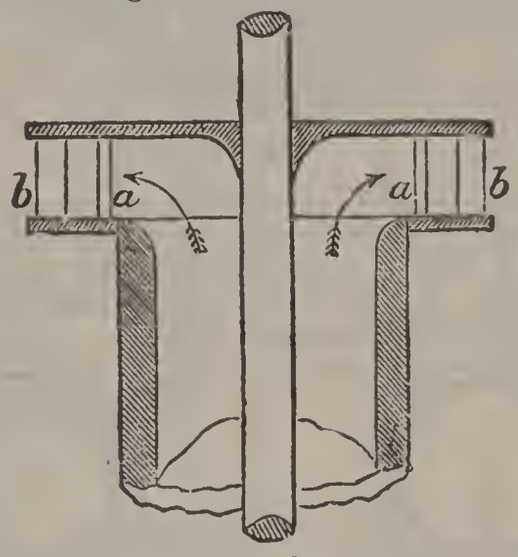


Fig. 9.

tion of the machine *bb;* or, second, a modification of the foregoing is to pass the water from the centre horizontally

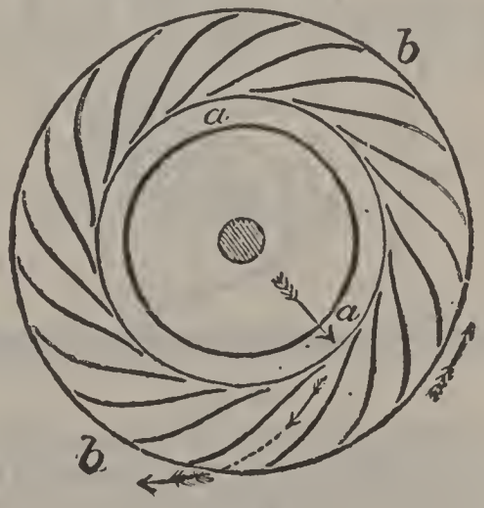


Fig. 10.

outward through fixed curved blades, *a*, *a*, figs. 7 and 8, so as to give it a rotatory or tangential motion, and there-

by cause it to act on the blades of the wheel, *bb*, which revolves outside.

In the reactionary wheel, in principle almost identical with the Scottish turbine (see BARKER'S MILL), the water is admitted at the centre of the wheel from below, passes to the circumference between curved blades of the wheel,

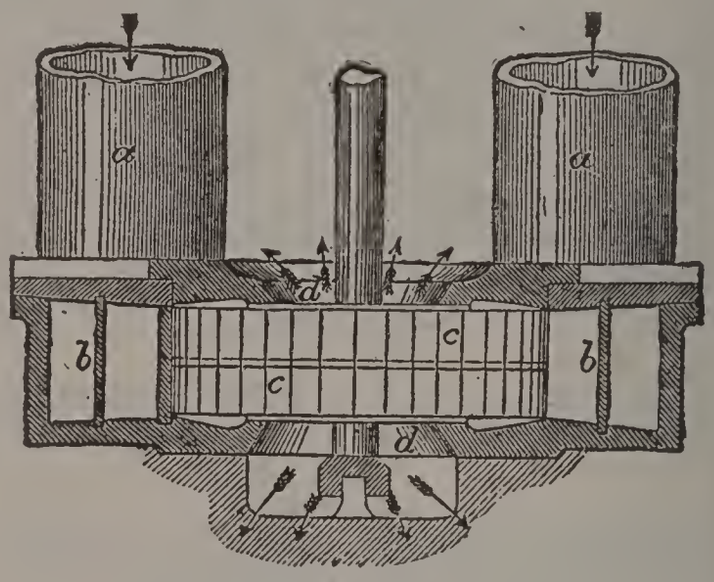


Fig. 11.

and escapes by tangential orifices at the circumference, there being valves made to open more or less, according to the quantity of water and to the power required. This form of turbine is shown in figs. 9 and 10, where the water enters at *aa*, and escapes by *bb*.

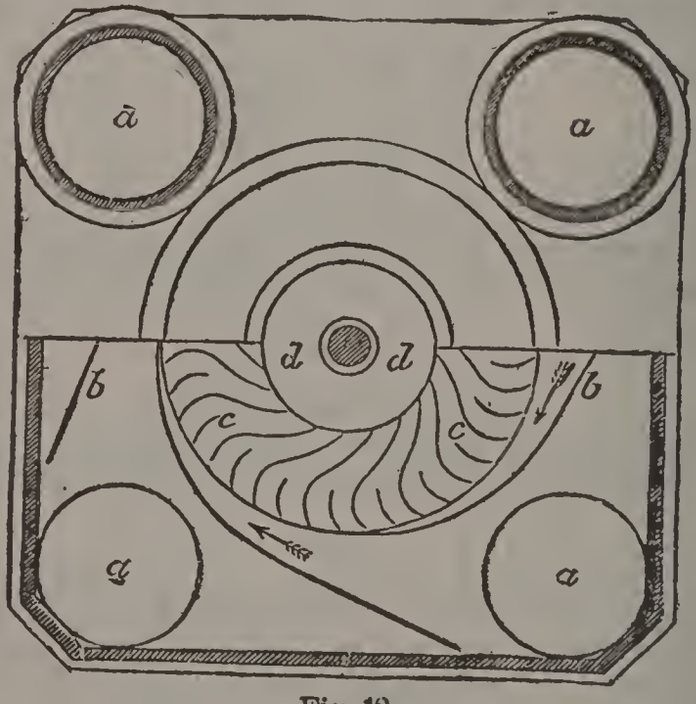


Fig. 12.

The vortex-wheel of Prof. Thomson (figs. 11 and 12) takes in the water after descending through the tubes, *a*, *a*, at the circumference, where, by means of fixed blades, *b*, *b* it acquires a tangential motion, and then passes through between the curved arm, *cc*, of the wheel, and escapes at

the centre, *dd*. As the two last-described wheels work always under water, they are not liable to be obstructed by back-water, or to have their power lessened thereby more than what *is* due to the diminished fall, and they are understood to yield a good percentage of power, sometimes stated at 75 per cent.; but all turbines are somewhat delicate, and liable to be choked by leaves or twigs, unless the water be carefully strained. Although only a few horizontal wheels are here described, they are exceedingly numerous.

The reciprocatory hydraulic engine (fig. 13) works ex

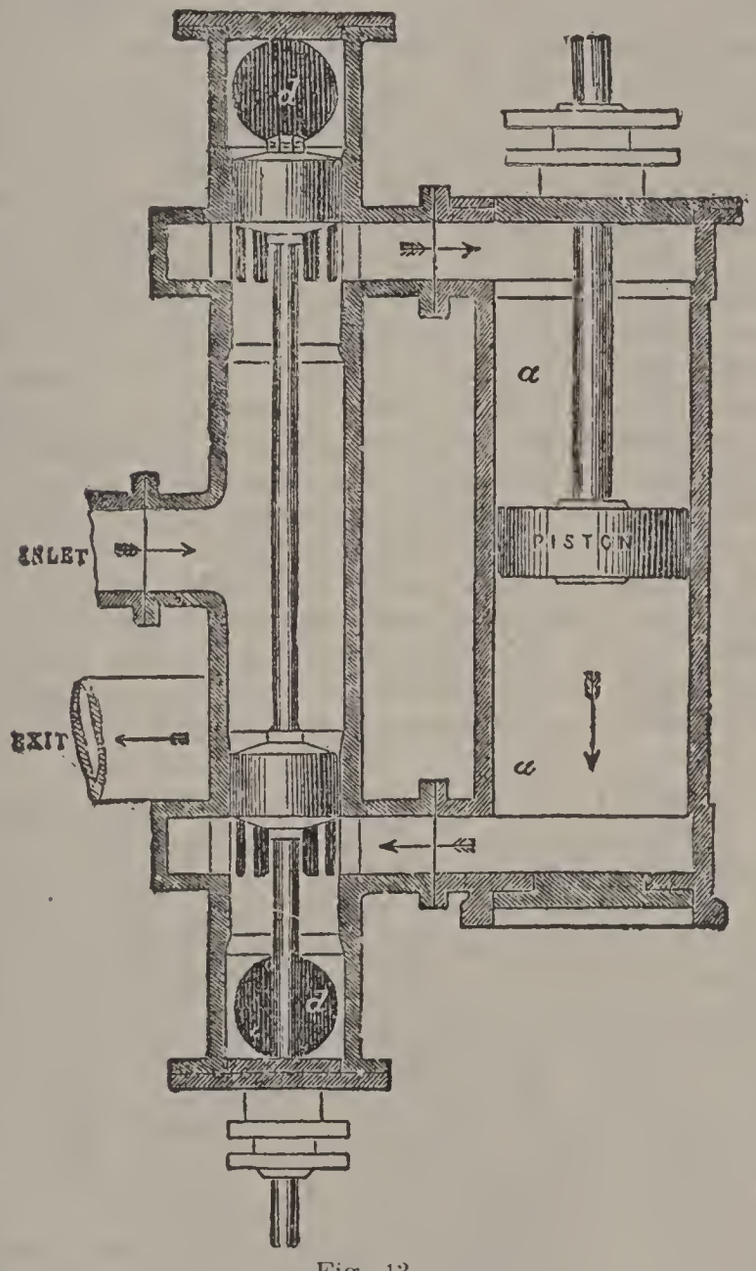


Fig. 13.

actly on the same principle as the ordinary non-condensing steam-engine. The water, under considerable pressure, is admitted at one end of a cylinder, *a*, the exit valve, *d*, at that end being simultaneously closed, while it is shut off from the other end, and the exit valve, *d*, there opened; and so the alternating action of the valves and of the piston goes on continuously. To work smoothly and effect

ively, the piston ought to be of large diameter, in proportion to the length of stroke, and to go slowly; otherwise the quick jerking is apt to shape and to injure the engine; and generally it is better to have two cylinders and pistons working together, as that enables them to work more equally, and to turn the crank without the use of a fly-wheel.

The turbine and the reciprocatory engine have the advantage of being able to take the use of a fall much greater in height than the diameter of the largest wheel that can be made; but for all ordinary falls a good breast or overshot wheel, or even an undershot, is, on the whole, generally considered preferable.

WATER-PROOFING: method or material by which a textile or other fabric is rendered water-proof. Besides the application of Caoutchouc, peculiar methods have been employed to render cloth impervious to water, at the same time allowing the passage of air; the absence of this property in the impermeable caoutchouc manufactures having been found disadvantageous. Two plans are adopted for water-proofing woolen cloths without rendering them quite impervious to air. The first is to dip the cloths into a solution of soap, and thoroughly rub it into the texture, after which it is dipped into a solution of alum; a decomposition of the soap and alum is affected, and the minute openings between the fibres are in some way partly filled so as to exclude water. In the second plan the cloth is dipped into a solution of gelatine or isinglass, and afterward into a solution of galls. A kind of tanning process is the result, the gelatine which has pervaded the cloth being rendered as insoluble as leather by its union with the tannin of the galls.

WATER-RAIL: a species of rail (*Rallus aquaticus*) widely distributed over Europe, Asia, and North Africa, and generally common, but, on account of its retiring habits and shyness, not often seen. It is about 11 inches long, olive brown above streaked with black, the under parts gray and the sides streaked. It frequents marshes and bogs, dives and swims well, but is a poor flyer. It is a delicious table-bird. In North America its nearest representative is the king rail (*R. elegans*). The name is applied generally to other species of aquatic rails (q.v.) in distinction from the land-rails and crakes (q.v.).

WATER-SCORPION: a bug of the family *Nepidæ*, whose species inhabit ponds, and take their popular name from the scorpion-like form of the fore-legs, with which they seize their prey. The remaining two pairs are slender and locomotory, and the abdomen terminates in a long, slender breathing tube. Some of the species carry the eggs in a layer on the under side of the abdomen. *Belostoma* includes the largest species with flattened bodies and four-jointed antennæ; *Nepa* is much

flattened and oval, and the antennæ are three-jointed and lamellate; while *Ranatra* includes species of linear form. The larvæ and nymphs of the water-scorpions resemble the imagoes in general aspect, but lack the wings of the latter. In all stages they are sluggish in movements and secure their prey by hiding and stealth. These insects are very interesting in habits and structure. See FRESH-WATER INSECTS.

WATER-SNAKE: a harmless colubrine American snake (*Natrix fasciata*), closely allied to the garter-snakes, but of aquatic habits, swimming and diving with great ease and skill, and spending its life largely in streams, ponds, and marshes. It lives largely upon fish, either alive or dead, frogs, tadpoles, newts, and aquatic insects and other small creatures. It is mottled in variable dull tints, and lively and pugnacious. Its eggs are laid in holes in stream banks and similar places. The common grass-snake of Europe, the only British serpent except the viper, is a near relative.

WATER SOFTENING: specifically the art of extracting from water the calcium (lime) and magnesium compounds which combine with soap and prevent the formation of lather, and thus are said to make the water hard; in general the extraction from water of any substance, lime, magnesia, acid, mud or other material which renders the water unsuitable for industrial use. Rain water contains only the soluble gases of the air, carbonic acid gas and oxygen, and such dust and dirt as it may have washed out of the air in its fall. Such water mixes readily with soap to form a slippery lather, and the water is said to be soft. If rain water runs down a clean, glassy slope to a stream, it is still nearly pure soft water. If it runs over limestone, or ground containing particles of limestone, it dissolves a small amount, perhaps two grains per gallon or one part of limestone to 30,000 parts of water; but for practical purposes this is still called soft water. If, however, the rain water sinks into the ground to remain a long time in contact with limestone, it dissolves greater amounts, frequently 20 grains per gallon of water and sometimes more than 100 grains per gallon; and water is commonly said to be hard if it contains more than 5 grains per gallon. Deep well waters are nearly always of this nature. In the arid plains of the w. part of the United States where the soil contains large quantities of common salt (chloride of sodium) and the other salts of sodium and potassium which are all readily soluble in water, the well waters are usually heavily charged not only with the salts of calcium and magnesium but also with the salts of sodium and potassium, and such water is called alkali water. The water which is found near the coal fields frequently contains sulphuric acid to the amount of 2 or 3 grains per gallon. Lakes contain the waters of many creeks and rivers and are usually soft water; but the

current is slow and there is some concentration due to evaporation of the water, so that lake water contains rather more mineral matter than river water and is on the border line between soft and hard. Lake Erie water contains about 5 grains per gallon of the salts of calcium and magnesium. The oceans are the final receptacles for the waters of the rivers and lakes and are subject to continuous evaporation, so that in the course of years the mineral matter has become concentrated and ocean water contains about 2,100 grains per gallon of mineral matter, made up of calcium carbonate, 8 grains; calcium sulphate, 75 grains; magnesium sulphate, 99 grains; magnesium chloride, 230 grains; potassium sulphate, 55 grains; sodium chloride, 1,633 grains; the great amount of sodium chloride and the relative scarcity of calcium and magnesium compounds being due to reactions which have taken place in the water. Great Salt Lake in Utah and the Dead Sea in Palestine (q.v.) are small bodies of water, like oceans, without other known outlets than evaporation, and since the rivers feeding them are heavily charged with common salt, these lakes contain much more of it in proportion than the oceans. Ocean water contains about 3.5 per cent mineral matter, the Dead Sea 26 per cent, and Great Salt Lake averages about 20 per cent.

When hard waters are evaporated the mineral matter is left in a solid mass, interesting examples being found in the stalactites and stalagmites in caves, in the incrustation about the teeth in the human mouth, and in the deposit in the bottom of tea kettles. The most serious damage produced by hard water in industrial operations is from the scale deposited in steam boilers and from the waste of soap in washing. Scale in boilers prevents the easy passage of heat from the fire to the water, and shortens the life of the boiler because of the excessive temperature to which the steel must be raised in order to force the heat through the scale to the water. The amount of extra fuel required to evaporate water in a boiler which is coated with scale varies with the thickness and character of the scale and with the rate at which the boiler is worked. When the boiler is being driven to nearly its full capacity, the amount of extra fuel required by a ¼-inch layer of scale is frequently as much as 50 per cent; but if the boiler is being worked at only half its capacity the difference may not be more than 10 per cent. Nearly all tables of such data are based on measurements of the additional amount of fuel required in a scale-covered boiler to heat the water at the same rate as in a clean boiler worked at normal capacity. It is estimated that the railroads of the United States are spending at least $15,000,000 annually in additional fuel and boiler repairs due to the hard and muddy water used in some parts of the country. Using hard water in boilers is much more expen-

sive than softening it, since on the average 1,000 gallons of hard water will do 50 cents' worth of damage in fuel and repairs, while 1,000 gallons of hard water may almost always be softened for less than 5 cents. The value of the soap wasted by hard water is enormous, amounting to 70 cents per 1,000 gallons of water 10 grains hard when it would cost perhaps 2 cents per 1,000 gallons on the average to soften such water.

The chlorides and sulphates of calcium and magnesium are readily soluble in water, but the carbonate of lime or magnesium (marble or ordinary limestone) is soluble only in water which contains carbonic acid gas (CO_2). It is a simple matter to soften water which contains only the bi-carbonate of calcium, because it is necessary only to steal away the extra molecule of CO_2 by adding a little fresh caustic lime which has a great affinity for carbonic acid gas and combines with it to form a molecule of mono-carbonate of calcium, which is insoluble, and, like the remaining molecule of mono-carbonate, settles to the bottom as precipitate. The chemical reaction is stated thus:

Calcium bi-carbonate		Slaked lime		Calcium mono-carbonate		Water
$CaCO_3(CO_2)$	+	$Ca(OH)_2$	=	$2CaCO_3$	+	H_2O

and thus there is precipitated to the bottom not only the original dissolved limestone but also the slaked lime which has become limestone by uniting with the molecule of carbonic acid gas which held the original limestone in solution. This discovery or invention was made in England by Dr. Clark about 1840, and no better or cheaper method has since been found for extracting carbonate of lime from water.

In the case of the sulphate of calcium no extraction in the above sense is possible, for we simply substitute sulphate of sodium for sulphate of calcium. The ordinary method of taking out sulphate or chloride of calcium is to add to the water the proper amount of sodium carbonate (soda ash or washing soda), when the sodium and calcium exchange acids as follows:

Calcium sulphate		Sodium carbonate		Calcium carbonate		Sodium sulphate
$CaSO_4$	+	Na_2CO_3	=	$CaCO_3$	+	Na_2SO_4

The calcium carbonate settles as a precipitate while the sodium sulphate remains dissolved in the water, and, for boiler or washing purposes, is harmless in any ordinary amount. In water softening operations the treatment for the magnesium salts is practically identical with that for calcium salts. Mud in suspension is taken out of soft water by making a precipitate from two substances such as sulphate of iron and caustic soda, so that the precipitate in settling will carry down the fine particles of mud. The oil taken up by steam in engine cylinders is extracted from the condensed water

in the same way, so that the water may be used again in the boilers. For boiler purposes it is most important that the softened water should be freed from precipitate and made perfectly clear, because the presence of particles of solid matter suspended in the water is the most potent cause of boiler foaming. When the reactions take place, and the young and fine precipitates are formed, in the presence of old precipitate, an agglomerating action results which rolls the small particles together in balls so that they settle easy. This is the best method known for clarifying the water. The best machines in use for carrying out these processes are automatic in their action and require only to be supplied with chemicals and to have the settled precipitates discharged by opening a valve at the bottom of the settling tank, each once in 24 hours.

WATER SPOUT: a remarkable meteorological phenomenon frequently observed at sea, and exactly analogous to the whirlwinds experienced on land. It occurs when opposite winds of different temperatures meet in the upper atmosphere, whereby a great amount of vapor is condensed into a thick black cloud, to which a vortical motion is given. This vortical motion causes it to take the form of a vast funnel, which, descending near the surface of the sea, draws up the water in its vortex, which joins in its whirling motion. The whole column, which after the junction extends from the sea to the clouds, assumes a magnificent appearance, being of a light color near its axis, but dark along the sides. When acted on by the wind the column assumes a position oblique to the horizon, but in calm weather it maintains its vertical position, and is carried along the surface of the sea.

WATER SUPPLY: The several sources of water supply for cities are rivers of constant flow, lakes, natural and artificial, ponds impounding reservoirs, springs, shallow wells in the drift, and deep wells in the rock. The enormous amount of water consumed daily compels the larger cities of the world to seek their sources of supply in rivers and lakes; springs, natural reservoirs, and wells usually not yielding an amount of water sufficient to meet the daily demands. Exceptions are found in the city of Vienna, which seeks its source of water supply in the Schneeburg Mountains of the Austrian Alps; in Munich, which obtains its water from springs in the Mangfall Valley; New York, which draws its supply from large impounding reservoirs at the headquarters of the Bronx and Croton Rivers; Boston, which depends upon artificial reservoirs impounding the stream flow of the Sudbury, Cochituate and Nashua rivers; Indianapolis, which obtains its water supply in deep wells in the limestone; Denver, which obtains its water from large impounding reservoirs in the valley of the South Platte river; and in one of the eight companies which

A TYPICAL WATERSPOUT.

furnish the water supply to the city of London, which draws its water from wells sunk in the London chalk formation. Excepting the Kent Works, all the remaining London water companies draw their waters from the Thames, Lea, and New rivers, with some small additions from wells and springs for the supply furnished by the East London and New River Companies. London, Rotterdam, Hamburg, Bremen, Berlin, Saint Petersburg, Warsaw, abroad; Albany, Philadelphia, Washington, Cincinnati, Saint Louis, Nashville, Pittsburg, and Louisville, in the United States, are among the large cities depending upon rivers as their sources of supply. Glasgow, Liverpool, Manchester, and Zürich, abroad; and Buffalo, Cleveland, Chicago and Milwaukee of the large cities in the United States, have their sources of water supply in lakes. The lake which supplies water to Liverpool is a large artificial reservoir created in the Vyrnwy Valley in the north of Wales, distant about 65 m. from the city, from which the water is drawn first to filters at elevation sufficient to supply the filtered water by gravity to the city. Glasgow draws its water from Loch Katrine; Manchester from Lake Thirlmere; Zurich from the lake of that name, or from the River Limmat, the outlet of the lake, a short distance from its mouth; the American cities mentioned take their source in the system of Great Lakes. One of the most notable instances of large volumes of water from deep rock wells is in the supply to the city of Indianapolis, which obtains its water from twenty-five wells drilled into the water-bearing limestone which abounds in that section of the country. Of the 25 wells, 20 are 10 in. in diameter, and penetrate the drift and rock, distances ranging from 300 to 320 feet, with an average depth of 308 ft., and 5 are 8 in. diameter, with an average depth of 295 feet. The average thickness of the drift in the locality of the wells is about 80 ft. The gauged daily capacity of the 25 wells 1898, Sep., was 18,700,000 gallons. In 1896 the yield of the system of driven wells which supplied water to Brooklyn was about 32,000,000 gallons. The pirncipal cities abroad drawing their water from ground sources are Schalke, Dortmund, Cologne, Dresden, Bochum, Leipsic, Stockholm, and Copenhagen, with yields ranging from 6,000,000 to 11,430,000 gallons. The Vanne water, which is used for dietetic purposes in Paris, is obtained from springs, and to preserve it without change of quality it is conducted to the city in a closed conduit, received in distributing reservoirs, from which the light is carefully excluded, and reaches the consumer quite as pure as it was upon issuing from its mountain source. Cities have been located not according to the rules of hygiene, but according to the requirements of commerce; revenue rather than health has been the dominating factor, and upon the sanitarian has fallen the burden of rectifying the evils which have

followed the total disregard in so many cases of one of the fundamental laws of health.

The various methods of supplying water to cities are embraced in the following systems (1st) by gravity from natural lakes or impounding reservoirs at elevation sufficient to furnish domestic and frequently fire pressure; works typical of this system are found in New York, Boston, Baltimore, San Francisco, and Saint Paul; (2d) by pumping from rivers or lakes, or other sources, to reservoirs placed at elevation sufficient to supply under pressure water for domestic purposes, and often for fire protection; works typical of this system are found in the older works of Philadelphia, Pittsburg, Cleveland, Cincinnati, Saint Louis, Louisville, Omaha, and Kansas City; (3d) by pumping from the sources mentioned under the second system to stand-pipes, which fix the head upon the pumps and the distribution system, and supplying direct into the distribution mains; works typical of this system are found in Chicago, Milwaukee and Detroit; (4th) by pumping into the distribution mains without the intervention of stand-pipes; works typical of this system are found in Indianapolis, Dayton, and Columbus.

Where impounding reservoirs are used at elevation sufficient to furnish a satisfactory pressure, these are invariably built with a view to carrying a volume of water which without the addition from rainfall would be sufficient to supply a city for at least six months, and naturally these basins become large sedimentation reservoirs, and the water as a rule is very satisfactory for drinking and other domestic uses. In the older works, where the water is pumped from rivers or lakes to storage and settling basins, the latter have been planned to contain several days' supply, and allow for a subsidence of the suspended matter in the water while retained in, or while passing through such basins. Where water is pumped under stand-pipes, of course, no subsidence takes place, and the water is delivered to the consumer in substantially the same condition as it was taken from the source of supply. The same condition holds good for direct service works in which neither reservoirs nor stand-pipes are used. Many of the smaller water-works built during the past twenty years have been carried out after the fourth system because it represents the least first cost, although less economical in operation than works which provide for pumping to reservoirs, or works pumping under stand-pipes.

In the early history of impounding reservoir gravity works, and works in which the water was pumped to large resrvoirs, it was thought a limited subsidence of a polluted river or lake water in such reservoirs would overcome all natural objections to the qnality of the supply. It is now known that no surface water, whether gathered in streams or lakes, is fit for domestic uses ex-

cepting it be subjected to some method of purification which will eliminate the suspended matters due to sewage, and the washing of detritus from the watersheds upon which the water is gathered. If it were possible to construct subsiding reservoirs of such capacity that the water might be retained for many days or weeks after being pumped from its source in order to secure a high percentage of subsidence of the suspended matter, this would remedy in part the objection to such water supplies taken from sources known to receive the effluents from city sewers, but the length of time required to successfully purify water in this manner is too great to admit of serious consideration of such a method of water purification for most cities, and filtration is resorted to as a means of doing in a short time what could be accomplished only in a very long time by means of sedimentation basins. Experiments with the water of the Ohio river at Cincinnati several years ago indicated that 30 days quiescent subsidence in reservoirs would reduce the bacterial content and turbidity about 97 per cent; filtration will rapidly reduce the bacterial content of polluted river and lake waters by 99 ± per cent, and almost entirely eliminate the turbidity. The reports of the performance of the filters at Upper Roxborough (Philadelphia), where the water is carried for a short time in subsiding basins before it is thrown on the filters, show the remarkable change which can be made in a few hours by means of plain sand filters, and it is scarcely likely that in the future construction of works of public water supply many instances will be found where settling basins are planned to furnish more than two days' subsidence of the water before it passes to the filters for purification. The objection to any sewage polluted water is founded entirely upon the matters carried in mechanical suspension. The waters of large lakes or rivers probably never contain dissolved matters which unfit them for drinking and other domestic uses, nevertheless, few of these sources contain water which in its natural condition is fitted for drinking and other domestic requirements, and any system of purification which will remove all the suspended matter will be found capable of rendering the waters of large lakes and rivers well adapted for domestic purposes. The sole purpose of water purification is therefore to remove matters in suspension, of which the bacteria are a part, and as this can be accomplished much quicker, cheaper and better by plain sand filters than by large subsiding reservoirs, it is fair to presume that the latter will find few places in the future history of waterworks engineering, excepting of course in such instances where the topography naturally suggests a gravity supply from impounding reservoirs of large capacity placed at an elevation sufficient to furnish the desired pressure in the street mains.

WATER SUPPLY.

Consumption of Water.—One of the two most important problems in connection with public water supply at the present time is how to restrict the large and growing per capita consumption. Meters on the service pipes of consumers are thought by many to be the remedy, but while no one objects to the metering of the gas which he consumes, few outside of a small circle of water-works students favor the metering of water, the fear naturally being that with the advent of water meters the water bill will increase in size, or that the quantity of water allowed per consumer may be uncomfortably restricted. It does not follow that the use of water meters will generally increase the consumers' water bills, nor will the meter in any way limit the use of water, but a large consumption will require the payment of higher charges than for a small consumption.

Some idea of the per capita consumption of water in the larger cities of the United States can be gained from the following table:

Cities 1900	Population supplied	Daily gallons	Per capita gallons
New York	2,049,000	245,700,000	120
Chicago	1,698,000	323,000,000	190
Philadelphia	1,294,000	287,188,000	229
Brooklyn	1,110,000	95,900,000	86
Boston	560,000	80,000,000	143
Cleveland	420,000	66,900,000	159
St. Louis	400,000	63,539,000	159
San Francisco	342,800	25,000,000	73
Cincinnati	325,900	39,600,000	121
Detroit	306,055	44,800,000	146
Milwaukee	300,000	24,000,000	80
New Orleans	287,104	13,820,000	48
Minneapolis	202,718	18,813,000	93
Providence	187,300	10,130,000	54
Indianapolis	169,164	13,400,000	79

Investigations in New York, 1900, by the Merchants' Association, showed meter measurements of water per capital per diem as follows: Of 25 houses where daily records for two weeks were taken in January, 18 used water at the rate of 51 gallons per capita, and 7 houses used water at the rate of 165.75 gallons per capita, or an average per capita consumption for the 25 houses of 91.36 gallons. At the same time, of 12 premises in Brooklyn 10 used water at the rate of 47 gallons per capita, and 2 used water at the rate of 121.45 gallons per capita, or an average for all consumers of 59.4 gallons per capita per diem. This consumption excludes the loss in the joints of street mains, but includes the loss from leaking fixtures. Mr. Croess estimated the per capita consumption as 116 gallons per day, which he thought by metering all domestic services could be reduced to 65,000,000 gallons per day.

The wide variation of consumption in different cities cannot always be easily accounted for. Thus in Denver the large per capita consumption can be attributed partly

to the necessity of taking water from the street mains for all purposes, including irrigation of lawns, trees and shrubbery, and partly to the lack of necessity at the present time for an economical use of water, but why Cleveland, a manufacturing city, should use or waste water at three times the rate of Providence, another manufacturing city, cannot so easily be explained, excepting that in the latter city nearly all service pipes are metered, while few meters are used in the former. No individual consumer is ever ready to admit that he wastes water, and doubtless fancies that considering his actual needs, he is very careful to draw no more than the quantity required by his bare necessities. Nevertheless, aside from the leakage at the joints of street mains, which ought not to vary widely in different cities, equipped with modern cast iron pipes, there is a difference in the per capita consumption which can only be accounted for by differences in the habits of the consumers.

Mr. Dexter Brackett, in a paper to the American Society of Civil Engineers, 1895, from investigations in and around Boston, showed that the per capita consumption ranged from 6.6 gallons in small domiciles with a single faucet to 46 gallons in first class apartment houses. From the same source the interesting fact is obtained that for 12 of the larger cities of the United States, the consumption of water per capita has rapidly risen during the twenty years prior to 1894, thus:

CONSUMPTION—GALLONS, PER CAPITA, PER DIEM.

City	1874	1875	1877	1893	1894	Increase, per cent.
Boston, Cochituate	72	..	..	....	101	40
Boston, Mystic	73	..	..	....	89	22
Chicago	96	..	..	147	...	53
Philadelphia	58	..	..	150	...	160
Brooklyn	54	..	..	86	...	60
St. Louis	55	..	..	95	...	73
Cincinnati	55	..	..	124	...	125
Cleveland.	45	..	..	130	...	190
Detroit	97	..	..	....	144	48
Milwaukee	..	29	..	108	...	272
Louisville	24	..	..	75	...	212
Providence	..	..	24	63	...	162
Fall River	12	..	..	27	...	125

In considering the consumption of water per capita per diem, some thought should be given to the unavoidable losses by leakage of reservoirs, pipe distribution systems, service pipes, and domestic plumbing. It is customary to charge the whole pumpage, or draft from impounding reservoirs or other gravity sources to consumption, while as a matter of fact, with few exceptions, about one half the so-called consumption is lost through leakage of reservoirs, pipe systems, and plumbing fixtures, and of the remaining one half, supposed to be

used, some waste might also be recorded. The information with reference to leakage of reservoirs is rather meagre, but it is well known that no reservoir is entirely watertight, and so long as the loss is not calculated to imperil the stability of dams, embankments, and like structures, nor create a costly or unallowable deficiency in the water supply, but little attention is paid to such losses.

Some data on the daily and percentage loss of water in concrete tanks, backed by well prepared clay puddle, from the Philadelphia water-works (1903) is given in the following table:

LEAKAGE OF BELMONT FILTER TANKS.

Area (one filter), 31,800 square feet; depth of water, 9 feet. Percentage leakage based on a daily flow of 4,380,000 gallons of water through each filter tank.

Filter—	Leakage in 24 hours.	Percentage loss.
1	970	0.0221
3	727	0.0166
4	970	0.0221
5	610	0.0140
6	243	0.0055
8	566	0.0129
9	728	0.0166
10	776	0.0177
11	582	0.0125
12	475	0.0108
17	849	0.0194
18	849	0.0194

Leakage of Water Mains.—Like the leakage of tanks and reservoirs, information on the actual leakage of large pipe systems is not nearly as full as it should be, and the lack of it often leads to unpleasant discussions with contractors upon the reasonable allowable leakage of pipe systems when completed and offered for acceptance and use. It is convenient to state the leakage in gallons per day of 24 hours, per mile of pipe without regard to the various sizes embraced in the system. It is obvious that a mile of 48-inch cast-iron pipe should show and be allowed a greater leakage than a mile of 12-inch pipe, and it would be much fairer and more accurate to state the leakage in gallons per 1,000 (or other measure) linear feet of lead pipe joint, because the leakage whatever it may reach in gallons per day is almost exclusively at the joints. According to Mr. James R. Croess, in his report to the Merchants' Association, on the *Waste and Consumption of Water in New York City 1900*, the leakage of the pipe distribution system of that city is as high as 142,000 gallons per mile per day of 24 hours, and of Brooklyn 60,000 gallons per mile per day; of Boston, 14,187 gallons per mile per day. The leakage of the pipe system of Fall River, where 94 per cent of all the water services are metered, is estimated as 24.40 per cent of the whole consumption; at Boston the leak-

age is estimated as 27.30 per cent of the whole consumption.

Carefully conducted tests for leakage of the several systems of pipe connected with the Belmont Filters, Philadelphia, furnished the following information:

Main supply pipe, consisting of 1,900 ft. of 48-in. pipe, 280 ft. of 42-in. pipe, 670 ft. of 36-in. pipe, 190 ft. of 30-in. pipe, 360 ft. of 24-in. pipe, and 340 ft. of 20-in. pipe, total 3,740 ft., or 0.7083 m., under a pressure of 50 pounds per square inch lost water at the rate of 4,030 gallons per day, corresponding to a leakage of 5,690 gallons per m. Main effluent pipe, consisting of 2,610 ft. of 48-in. pipe, 140 ft. of 42-in. pipe, 120 ft. of 36-in. pipe, 430 ft. of 30-in. pipe, 470 ft. of 24-in. pipe, and 730 ft. of 20-in. pipe, total 4,500 ft., or 0.852 m., under a pressure of 50 pounds per square inch lost water at the rate of 8,640 gallons per day of 24 hours, corresponding to a leakage of 10,140 gallons per m. The raw water drain pipe consisting of 1,820 ft. of 24-in. pipe and 840 ft. of 20-in. pipe, total 2,660 ft., or 0.504 m., under a pressure of 50 pounds per square inch, lost water at the rate of 5,040 gallons per day of 24 hours, corresponding to a leakage of 10,000 gallons per m. The effluent drain pipe, consisting of 1,440 ft. of 24-in. pipe, 570 ft. of 20-in. pipe, and 440 ft. of 18-in. pipe, total 2,450 ft., or 0.464 m., under 50 pounds pressure per square inch, lost water at the rate of 2,448 gallons per day of 24 hours, corresponding to a leakage of 5,276 gallons per m. The refill pipe, consisting of 1,670 ft. of 20-in. pipe, and 760 ft. of 16-in. pipe, total 2,450 ft., or 0.46 m., under a pressure of 100 pounds per square inch, lost water at the rate of 6,480 gallons per day of 24 hours, corresponding to a leakage of 14,087 gallons per m. The pressure pipe which supplies water under 80 pounds pressure per square inch to the sand ejectors and washers, consisting of 460 ft. of 20-in. pipe, 750 ft. of 16-in. pipe, 170 ft. of 12-in. pipe, 360 ft. of 8-in. pipe, 640 ft. of 6-in. pipe, and 450 ft. of 4-in. pipe, total 2,830 ft., or 0.536 m., under a pressure of 100 pounds per square inch, lost water at the rate of 2,500 gallons per day of 24 hours, corresponding to a leakage of 4,664 gallons per m. The average diameter per m. of each of these lines or systems of pipes is larger than that of cast-iron pipe in a city pipe distribution system.

Considering the percentage loss based on the daily flow of water through the pipes, the losses were as follows:

Line of Pipe—	Percentage loss.
Main supply	0.0101
Main effluent	0.0216
Raw water drain	0.1008
Pressure	0.02083

Filtration.—No single aspect of public water supply is today of more importance than the quality of the

water supplied from day to day. Upon the quality of the water may rest the health and commercial welfare of a community. Many cities have been temporarily injured by the known bad quality of their water supply, and many distressful and costly epidemics of typhoid fever may be properly attributed to the temporary use of a sewage polluted water. The remedy for this condition may be found in changing the source of supply, when this is possible, but for some cities the only alternative is the adoption of some method of water purification which will eliminate the germs of disease from the water. The only practical method of purification thus far adopted by cities is filtration, of which several systems have been tried, but only one of which, that is, plain sand filtration, has successfully withstood the test of time. The filtration of water for public use was first installed by Mr. James Simpson at the Chelsea Waterworks, London, 1838. Parliament in 1852 passed an act requiring all the so-called river works of London to filter their water before it was delivered to the consumers.

No substantial difference exists between the original plain sand filter proposed by Mr. Simpson in 1838 and the modern plain sand filter which was carried out at the present time on a grand scale for the city of Philadelphia. In each case the filter consists of a masonry tank in the bottom of which are placed pipes to conduct away the filtered water; above and around the pipes is spread coarse gravel ranging in material as large as one's fist to coarse sand, upon which is placed a bed of so-called filter sand, with suitable arrangements in the matter of pipes and valves to control the rate of inflow of unfiltered water to the filter, and of filtered water from the filter to the clear water basin. However, the subsequent extended use of plain sand filters in several of the larger cities of Europe, notably Saint Petersburg, Warsaw, Dantzig, Berlin, Bremen, Hamburg, the works of London, Edinburgh, Liverpool, and other cities of the United Kingdom, has had the effect of largely improving the mechanism required for the proper control of such filters. It is altogether probable that the first filter built by Mr. Simpson at the Chelsea Works, London, may have given as satisfactory effluents as any built subsequently, but the lack of convenient and proper analytical tests at the date mentioned makes it impossible at the present time to show what changes were effected by Mr. Simpson's very simple yet very wonderful adjunct of waterworks which are compelled to draw their supplies from sources of known or suspected sewage pollution.

The real merits of the plain sand filter were never understood until after the improvements in bacteriology, made by Dr. Robert Koch, became a part of water analysis, in fact all the refinements for the technical investigation of water supplies have been developed, and many of them perfected, within the last 20 years. If the means

of technical water investigation had been as good 60 years ago as they are today, and the same interest felt by communities in the character of their public water supplies, filters would today be as much a part of municipal water-works (where the water is drawn from streams, lakes, and ponds which receive sewage effluents) as is the pumping machinery, storage, and settling reservoirs, stand-pipes, and the cast-iron or other mains which convey the water to the consumer. Pumps, pipes, and reservoirs are regarded as essentials of water-works, and the proposition to incorporate each or all in any system of works excites only ordinary business interest, and involves only two simple considerations: first, the capacity of such details; and second, the cost of construction, operation, and maintenance, while filters at the present time are still regarded, if not as unproven details of water-works construction, certainly as details, the efficiency of which is still a matter of doubt; and this condition may be ascribed very largely to the lack of facilities for the technical investigation of water going to and coming from the older filters in the cities of Europe, rather than to any lack of efficiency in the performance of the filters. When Mr. James P. Kirkwood, the father of water-works engineering in the United States and one of the most distinguished members of the profession, visited Europe in behalf of the city of Saint Louis, to examine and report on the filters at that time in operation in London, Berlin, and other cities abroad, it is probable that the filters generally were performing as well then as they are now. Perhaps their work from day to day was not as regular as it is now because the means and facilities for measuring the work and controlling the operation of the filter were not at that time so well established as they are now. Substantially the only real attempt to improve the art of filtration of public water supplies since the publication of Mr. Kirkwood's classic report on the filtration of river water, and indeed since the introduction of the plain sand filter at the Chelsea Works in 1838, has been to reduce the cost of constructing and operating the filters, to materially increase the rate of percolation, or to maintain a constant high standard of efficiency without regard to the quality of the applied water. The only obstacle to the broad introduction of plain sand filters with suitable adjuncts for the purification of a sewage polluted public water supply, is the lack of confidence in the practical results to be obtained, and when this confidence is established, as it will be in due time, it will then be a matter of wonder why so many of the large cities of the United States like Boston, New York, Philadelphia, Baltimore, Cleveland, Cincinnati, Saint Louis, and Chicago have been willing to continue the use of polluted public water supplies for so long a time, when the remedy was to be found in engineering structures, simple of construction

and operation, and as certain in the performance of their work as the highest class of pumping engine used to lift water from lakes and rivers to settling and storage basins, or to pump it under stand-pipes into the distribution mains. It is a fact not often recognized that in any large city upward of 90 per cent of the population, where the source of water supply is from the public mains, are wholly dependent upon the city, not only for the quantity but for the quality of their water for all purposes. Nine tenths of the people are unable, or unwilling, to adopt domestic appliances for the purification of polluted water, and unless the municipality undertakes to supply a satisfactory water, fully this proportion of the population, by force of circumstances or indifference, will continue to use such water as may come to them through the street mains, and any steps which a city may take to broadly improve the quality of its water supply may properly be regarded as an effort to improve the health of at least nine tenths of its population. The wealthier residents of any city may easily overcome the objections to a polluted water supply, so far as it affects their own homes only, by the introduction of domestic filters, many of which, if properly attended to, can be relied upon to furnish satisfactory drinking and culinary water, but this is only a partial safeguard even to the users of the water, because it will guarantee satisfactory water only in their own homes, and when they leave their homes for places of business or pleasure they may be compelled to use the polluted water, and the effect of their individual efforts to improve the quality of the water in their respective homes will be partially lost. The influence on health of a bad water supply for a large city is not limited to the city, but will have a far-reaching effect on cities many miles distant by reason of the intercourse between the larger and the smaller cities. It is thus possible for the polluted water supply of a large city to partially defeat the effect of a very perfect supply in some of the smaller cities surrounding it, visitors from the smaller to the larger city drinking the polluted water, and carrying away the germs of typhoid fever, and other water-borne diseases.

Belmont Filtration Works.—The Belmont Filtration Works supply that part of Philadelphia which lies west of the Schuylkill river, consisting at present of a population estimated at 170,000, growing at the rate of 3.64 per cent per annum, and which, it is assumed, will have a population in 1950 of 550,000 in round numbers. The water supply is pumped from the Schuylkill river at the present Belmont Station, located on the west bank of the Schuylkill river about in the centre of the west division of Fairmount park.

The works consist of two subsiding basins, executed partly in excavation and partly in embankment, having a total depth from the top of the embankment to the

floor of the reservoir of 29 ft., and an available water depth of 25 ft. The reservoir consists of two divisions, known as the east and west divisions, which contain a flow line of about 36,000,000 gallons, representing at the present time about 2.4 days' sedimentation of the water before it is drawn from the basins to the preliminary filters. Each basin has an inside and outside slope of two horizontal to one vertical, the interior of the floor and the slope being first covered with a heavy layer of clay puddle rolled in place, over which is placed a 5-in. thickness of concrete paving as a monolith, upon which up to within 10 ft. of the high water line is placed a layer of asphalt $\frac{5}{8}$-in. thick. The clay puddle consisted of 50 per cent of mixed clay and 50 per cent of clean stone ballast, tempered in an ordinary pug mill, and placed and rolled on the floor in two separate layers. Upon the slopes the puddle was rolled in layers 6 in. thick in excess of the actual requirements, and the surplus trimmed off to true slope lines.

From the sedimentation reservoir the subsided water is conveyed to a system of 20 preliminary filters, consisting of concrete tanks 60 ft. long, 20 ft. wide, and 8 ft. deep, in which are placed materials very much like that in the plain sand filters excepting that the sand is more uniform of grain and coarser; the underdrain material at the bottom is likewise made up of coarser material and placed 12 in. deep, with suitable pipes to conduct the subsided water to the filters, and to conduct the prefiltered water to the plain sand filters, and a system of wash pipes by means of which the bed of sand lying above the underdrain material is washed in place from time to time as may be required. The purpose of the preliminary filters at Belmont, and at the other works forming part of the improvement of the water supply of Philadelphia, is threefold; first, to enable the plain sand filters to operate at a higher rate than has heretofore been employed, and correspondingly reduce the acreage of plain sand filter surface required to treat the subsided water; second, to prolong the life and increase the yield of the plain sand filters between scrapings from 60,000,000 or 70,000,000 gallons per acre, to from 90,000,000 to 150,000,000 gallons per acre; third, to obtain a more regular and better effluent than is possible with the plain sand filter when supplied only with water which has been undergoing subsidence for a few days. The preliminary filters are intended to perform in a short time what could be accomplished only in a very long time by simple sedimentation.

The plain sand filters at Belmont consist of 18 covered concrete tanks, arranged in groups of six each, having dimensions varying from 196 to 272 ft. in length, and from 120 to 165 ft. in width, giving a net area of filter at the sand line of 0.735 acre. The floors of the filters consist of concrete inverted arches 15 ft. 3 in. square,

with a depth of arch at centre of 8 in., a thickness of 6 in. at the centre, and of 14 in. under the piers. The roof arches have the same span as the floor inverts, a rise at the centre of 36 in., a thickness at the crown of 6 in., and of 15 in. at the spring line normal to the soffit. The roof arches are carried on monolithic concrete piers, 9 ft. 1 in. high, 30 in. square at the base, and 22 in. square at and above the sand line, giving a total height from the centre of the invert under the floor to the centre of the roof arch of 12 ft. 9 in. Against the side and end walls of the filters a layer of concrete (mixed and placed as in the sedimentation reservoir) is rolled or rammed in place to render the filters watertight. The end walls of all filters, and the side walls of the end filters, are designed as abutments to transmit the arch thrust to the foundation. In the roof of each filter is placed a system of ventilators which can be opened in the summer time to ventilate the filter when the sand bed is being cleaned, and the filter being prepared for another run, but in winter time these ventilators are closed in order to avoid freezing of the sand at any time when it is laid dry for the purpose of scraping. Above the concrete arched roof of the filter is placed a thickness of 36 in. of earth rolled in place, finished with top soil and seeded, in order that in due time the upper surface of the filter, as well as the slopes, will be covered with a neat turf, partly for protection of the materials in the earth fill over and around the filters, and partly to improve the appearance of the work. Each filter is provided with automatic regulators, one on the influent pipe to maintain a constant level of water over the sand bed, and the other on the effluent pipe to maintain a constant rate of operation of the filter, and incidentally to measure its rate and amount of work. The regulators are controlled by large copper floats which rise and fall with changes in the level of the water. In the effluent chamber the regulator consists of a telescoping weir which gradually descends in its guiding pipe until the depth of water in this chamber represents the maximum loss of head under which it is desired to work the filter. The relation of the lip of the weir to the copper float from which it depends is adjustable in order to vary the rate of percolation through the filter, thus when first put in service the rate of operation may be 1,000,000 gallons per acre per day of 24 hours, and in the course of two or three days the rate is increased to 6,000,000 gallons per acre per day, by the adjustment of the relation of the lip of the weir to the surface of the water in the effluent chamber. The telescoping tube slides through an annular cup leather packing, which maintains a watertight joint between the tube and the barrel into which it slides. In the centre of each filter at the bottom is placed a main collector with which are connected at intervals of 15 ft. 3 in. the lateral collectors that reach from the main collector nearly to the

side walls of the filter tank. The main collector is a watertight channel, constructed of concrete, and the lateral collectors are made of 8-in. and 6-in. vitrified terra cotta pipes, perforated for their entire circumference from end to end. Around the main and lateral collectors to a depth of 16 in. above the lowest point in the floor of the filter is placed the underdrain material consisting of five sizes of gravel, ranging from 3 in. in diameter to material that will pass a No. 14 sieve and be intercepted on a No. 20 sieve, arranged in successive layers of 6 in., 4 in., 3 in., and 1 in., the smaller material, of course, being placed at the top in the 1-in. layer.

In placing the underdrain material in the filter, three different plans have been followed; one in which the material is placed horizontally from wall to wall of the filter impinging against the intermediate piers; another in which the underdrain material impinges against the piers but is kept a distance of 24 in. from the side walls, and still another, which is regarded as the ideal arrangement, in which the underdrain material is kept 20 in. from the piers and 24 in. from the end and side walls. In the latter plan it is impossible for water to flow down between the masonry of the piers or walls of the tank, and pass into the underdrains without percolating horizontally through at least 20 in. of sand.

The sand in the filters consists of either river or bank sand, properly freed from clay, dirt, and organic matter, ranging in size from grains which will pass a sieve having six meshes to the linear inch, to grains which will not readily pass a sieve having 80 meshes to the linear inch. The sand is placed to a depth varying from 28 to 42 in. over the underdrain material, and constitutes the true filtering material. When the surface of the sand bed becomes clogged with the suspended matter removed from the water, and the maximum loss of head is reached, the filter is taken temporarily out of service, and the layer of sand at the surface is carefully scraped off for a depth of from $\frac{1}{2}$ to 1 in., and heaped in little piles in the several bays of the filter. After the filter has been scraped the sand is thrown out by an ejector, worked by a current of water under pressure of from 60 to 80 pounds per square inch, to the sand washers in the courts in front of the filters, where, after it is washed, the sand is stored until such time as it becomes desirable by successive parings of the sand bed to renew the full depth of sand in the filter.

From the filters the water is conveyed through cast-iron pipes 48 in. in diameter, to a clear water basin constructed with concrete inverted arches under the floor, square plumb piers, and concrete arches of the same dimensions, and in the same manner as the filters, excepting that the total height from the centre of the floor invert of the clear water basin to the crown of the arch at the soffit is 18 ft., which provides for a water depth of

15 ft. From the clear water basin the filtered water is conveyed through cast-iron pipes into the distribution system.

The Belmont filters are intended to operate at the rate of 6,000,000 gallons per acre per day, giving a capacity for each filter in service of 4,410,000 gallons, corresponding to a rate of percolation through the sand bed of 19 ft. per day of 24 hours, or of 9 in. per hour. The daily capacity of the Belmont station (18 filters), allowing 15 per cent reserve for scraping, washing, and renewal of sand, and such other operations as may require filters from time to time to be temporarily out of service, is 65,000,000 gallons, although for the first two years they will be operated not in excess of the capacity of the preliminary filters, namely, 40,000,000 gallons per day. By the addition of 25,000,000 gallons preliminary filter capacity this station will be raised to 65,000,000 gallons per day, which is thought to be sufficient to meet the requirements of that portion of the city lying west of the Schuylkill river for a period of 25 or 26 years, after which time, not only will the preliminary filter capacity be raised, but additional filters will be built on land reserved for the purpose south of the present installation.

Population and Pipe Mileage.—The most expensive waterworks to build and maintain, other things being equal, will be that in which the population per mile of pipe distribution system is the least. The city of Denver contains one mile of distribution pipe for every 304 of the population. At one time this city was supplied by two rival companies, and in many miles of streets the distribution mains are duplicated. Prior to the consolidation of the Denver Union Water Company and the Citizens' Water Company over 70 m. of the former company's mains had been paralleled by its rival, and the competition at one time was so strong that one or both companies actually furnished water to their consumers without charge; eventually the two companies combined in the Denver Union Water Company, and the consolidation then owned the mains of the two former companies. This fact, in part, accounts for the excessive mileage of pipe relative to population in that city. The influence of a dense population in Greater New York is shown in the very large population per mile of water pipe, which is nearly two and one-half times that of Philadelphia and Saint Louis, and three times that of Boston. Omitting the cities of New Orleans and Nashville, in which, by reason of the large percentage of colored population, the mileage of pipe is small compared with population, New York, in which the population per square mile of territory is very large, and Denver, where the condition of pipe mileage is abnormal compared with population, it will be seen that in all the other cities the relation of population and mileage of distribution pipe is fair, the

population per mile of pipe increasing generally with the size of the city.

MILEAGE OF WATER PIPES OF VARIOUS CITIES AND THE POPULATION SUPPLIED.—1900.

City—	Total mileage of water pipes.	Total population.	Population per mile of pipe.
New York	1,539	3,437,274	2,233
New Orleans	125	300,000	2,400
Nashville	86	110,000	1,280
Chicago	1,872	1,698,575	908
Philadelphia	1,320	1,293,696	980
Saint Louis	616	575,238	934
Boston	706	560,892	794
Cleveland	549	381,768	695
Detroit	617	375,000	608
Buffalo	500	352,219	704
Washington, D. C.	370	289,000	781
Milwaukee	338	285,315	844
Pittsburgh	323	236,761	733
Minneapolis	266	202,718	762
Providence	326	187,297	574
Indianapolis	208	169,000	812
Denver	440	133,859	304
Toledo	170	131,822	775
Albany	132	100,000	758
Richmond	94	85,050	905

Compound and Triple Expansion Pumping Engines.—The large increase in the demands for water by all the larger cities of the country during the past 20 years has stimulated manufacturers of large high duty pumping machinery to unusual efforts in the attempt to reach an engine economy not attained by any other type of steam-engine. Higher steam pressures, higher piston speeds, higher expansions, and improved shop work have enabled the builders to obtain duties today which 20 years ago were thought by many to be unattainable with steam-engines. As a rule the more modern engines are being built in larger units, partly to diminish the cost for a given daily pumping capacity and partly by reason of the improved materials, design, and shop work entering into the construction of these machines which largely diminishes the probability of serious derangement or accidents in service. Nearly all of the best engines are of the crank and fly-wheel type, all have steam jacketed cylinders, and with the exception of some of the pumping engines built by the I. P. Morris Company, all are constructed with single acting plunger pumps. The present cost for triple expansion crank and fly-wheel pumping engines per million gallons of capacity against 100 ft. pumping head is about $2,650.

Consumption, Income, Operating, and Maintenance Charges.—Interesting data on the operation of city water-works is found in the official reports of the cities, and in the statistics of the operation of private companies, from which it is shown that in a long established works, irrespective of population, water supplied per day

and income, the operating and maintenance charges, excluding expenditures for extensions and betterments, fixed charges on bonded indebtedness and taxes (which, of course, are paid only by private water companies), are roughly about 30 per cent of the income from water rents. In exceptionally well managed works, like those of Providence, R. I., and Milwaukee, Wis., in both of which meters form a part of the water supply system, the operation and maintenance charges are considerably less than 30 per cent of the income from water rents. In other works where the management is less systematic and rigid, or where the conditions connected with the supply of water are more onerous than in the cities mentioned, the operation and maintenance charges are considerably more than 30 per cent of the income. In determining the income which should be received from water rents by a system of water supply, whether operated by the municipality or by a private company, in which it is known that the property is conducted in a careful and economical manner, it will often assist the managers to know the relation which the income from water rents should bear to the known cost of operation and maintenance, and this being known, to adjust the water charges equitably among the various kinds of consumers to produce the income required to meet all the natural charges created by a system of public water supply. These charges may be divided conveniently as follows: first, operation and maintenance charges; second, extension and betterment charges; third, taxes, if the works are owned and operated by a private corporation; fourth, the fixed charges on the cost of construction or bonded indebtedness; fifth, an annual allowance for the renewal of such parts of the works as, for example, pumping engines and boilers, which are subject to a known rate of deterioration; and sixth, if the works are owned and operated by a private company, a reasonable allowance for dividends on the capital stock.

The last five items will usually absorb in round numbers about 70 per cent of the income from water rents.

Where the quantity of water to be pumped is small, it will often be found very convenient to use gas or gasoline engines and triplex pumps. Works up to 2,500,000, or more, gallons per day have been planned and are operating on this system. The advantage of the gasoline engine is that it entirely avoids the expense for boiler house, the cost of operating and maintaining boilers, the expense of chimneys, and if the water is pumped to reservoirs, whenever the machinery is temporarily out of service there is no cost due to banking fires and maintaining steam pressure, as in the case with a steam operated works. See WATER-WORKS; RESERVOIR; DAM.

WATER TABLE: in architecture, a projecting stone

sloped on the roof to throw off water. It occurs in buttresses and other parts of Gothic architecture.

WATER-TOWER: portable pipe through which, when erected vertically, water is forced for extinguishing fires. The pipe is in sections that may readily be joined end to end, and raised like a tower to a height equal to their total length. The base section is secured on trunnions; to it beneath is attached a hose from the water-main in the street or from a fire-engine. The requisite number of sections having been joined together, the tower is raised to the perpendicular, and the head of water turned on. Another form of water-table consists of a derrick which is raised to perpendicularity by two chemical engines, in which the piston is actuated by pressure of carbonic acid gas, generated on the spot by the reaction of sulphuric acid on sodium bicarbonate. The derrick having been made to stand erect, the pipe is raised above it to the requisite height by means of a hand-winch, pulleys, and a wire rope. The nozzle can be directed from below at will toward any point.—Water-tower is one of several kinds of apparatus denoted by the term Stand-pipe.

WATERTOWN, *waw'tėr-town:* town in Middlesex co., Mass.; on the Charles river, and on the Fitchburg railroad; 6 m. w. of Boston. It contains museums, churches, high school, public library, U. S. arsenal, banks, weekly newspaper; and manufactories of paper bags, carpet lining, stoves, starch, needles, laundry machinery, and foundry products. Prof. Eben N. Horsford, of Harvard University, has claimed for Watertown that it is the site of the city or town of Norumbega, founded by the Northmen more than 800 years ago. The discovery of the remains of the town was celebrated under the auspices of the American Geographical Society, 1889, Nov. 21, at a commemorative tower erected near the junction of Stony brook with Charles river, where the first discovery was made. A tablet let into the tower recites that the region was first seen by Bjorni Herjulfson A.D. 985; that the Charles river was discovered by Leif Erikson A.D. 1000; that it was explored by Lief's brother A.D. 1003; and that the region was colonized by Thorfinn Karlsefni A.D. 1007.—Pop. (1910) 12,875.

WATERTOWN: city, capital of Jefferson co., N. Y.; on the Black river, and on the Rome, Watertown & Ogdensburg railroad; 70 m. s.-by-w. of Ogdensburg, 90 m. n.n.w. of Utica. It is an agricultural and dairy region; and, owing to the abundant water-power afforded by the river which falls 112 ft. within the city, has become an important manufacturing place. The city is lighted with gas and electricity, is well drained, and has an electric street railroad. There are 20 churches, 9 public schools, public library, new U. S. government building (cost $75,000), new state armory (cost $25,000), co.

clerk's office (cost $25,000), soldiers' monument (cost $10,000), Y.M.C.A building, Keep Home for Aged People, hospital, and orphans' home. There are 5 national banks, 1 savings bank, 2 daily, 2 weekly, 3 semi-weekly periodicals. The manufactures comprise portable and stationary steam-engines, wagons, sleighs, locomotive vacuum brakes, lamps, doors, sash and blinds, and other articles. Pop. (1900) 21,690. (1910) 26,730.

WATERTOWN, S. Dak.: city, county-seat of Coddington co.; on the Big Sioux river, and on the Chicago & Northwestern, the Minneapolis & Saint Louis, the Burlington, Cedar Rapids & Northern, the Chicago & Northwestern, and the Great Northern railroads; about 100 m. n.-by-w. of Sioux Falls. It is in a fertile agricultural region, in which the chief product is wheat. Stock-raising is given considerable attention. The city has flour mills, machine shops, large grain elevators, and stock-yards. It has an extensive trade in grain and live-stock. About three miles from the city is Lake Kampeska, one of the beautiful bodies of water of the state. There are eight churches, a public high school, and graded elementary schools. The three national banks have a combined capital of $125,000. Pop. (1910) 7,010.

WATERTOWN: city in Jefferson co., Wis.; on the Rock river, and on the Chicago & Northwestern and the Chicago, Milwaukee & St. Paul railroads, 37 m. e.-by-n. of Madison, 43 m. w.-by-n. of Milwaukee. It is in a rich agricultural region, on both sides of the river at its great bend; and contains several churches, graded union schools, Northwestern Univ. (Luth.), the College of Our Lady of the Sacred Heart, banks, and daily and weekly newspapers. The river affords excellent water-power, utilized in manufacture of flour, woolen goods, lumber, sash, doors and blinds, furniture, cigars and beer. Pop. (1900) 8,437; (1910) 8,829.

WATER VALLEY, Miss.: city, one of the county-seats of Yalobusha co.; on the Illinois Central railroad; about 140 m. n.-by-e. of Jackson, the State capital, and 15 m. n. of Coffeeville, the other county-seat. It was settled in 1855 by William Carr; incorporated in 1867, and chartered as a city in 1890. It is in an agricultural region, in which cotton is one of the principal products. It has considerable lumbering interests. The chief manufacturing establishments are cotton mills, railroad repair and construction shops, in which there are 500 men employed, a lumber mill, foundry and machine shops, and woodworking factory. The city owns and operates the electric-light plant and the waterworks. The two banks have a combined capital of $48,000. The government is vested in a mayor and board of aldermen consisting of seven members elected every two years. Pop. 3,500.

WATERVILLE: city in Kennebec co., Me., on the

Kennebec river, and on the Maine Central railroad; 18 m. n.-by-e. of Augusta, 80 m. n.n.e. of Portland. It derives abundant water-power from the Ticonic Falls, which runs the machine shops of the railroad and manufactories of woolen goods, machinery, castings, flour, lumber, leather, sash, doors, and blinds, shirts, boot-shanks and other articles. Waterville is the seat of Colby Univ. (Bapt.), and contains 8 churches, 3 nat. banks, 1 sav. bank, and 3 weekly and 7 monthly periodicals. The Kennebec river is navigable to Waterville, giving it importance as a shipping-point. Pop. (1900) 9,477; (1910) 11,458.

WATERVILLE, N. Y.: village in Oneida co.; on the Lackawanna railroad; about 22 m. s.w. of Utica. It is in an agricultural region in which hops and vegetables are the chief products. It has steam grist mills, woodwork factory, and shoe factory. The principal public buildings are the Granger and Masonic halls, the Y. M. C. A. building, and the churches and schools. There are six churches, a high school established in 1872, public graded schools, and a public library. There are two banks. Pop. (1900) 1,571; (1910) 1,410.

WATERVLIET, N. Y.: city in Albany co.; on the Hudson river, the Erie canal, and the Delaware & Hudson railroad; opposite Troy and 4 m. n. of Albany. It is connected with Albany by steam and electric railways, and thus with the New York Central & Hudson River railroad. It is connected with Troy by an iron bridge, over which pass electric cars for both passengers and freight, and by regular ferry-boats. It is at the head of river navigation, and has, by means of the Hudson river, water connection with New York and intermediate points, and by means of Erie canal with the interior of the State and with Lakes Ontario and Erie ports.

In 1900 (government census) there were 135 manufacturing establishments, which were capitalized for $1,826,691 and which employed 1,167 persons. The value of the yearly products was $1,809,241. It has manufactories of woolen goods, bells, iron products, sashes, doors, and blinds, metal harness parts, street cars, car-journal bearings, machine-shop products, and scales. In 1807 the U. S. government established here the Watervliet Arsenal, one of the largest plants for the construction of siege ordnance and field and coast defense belonging to the United States. The arsenal is on a reservation of 109 acres, which has a wharfage, on the Hudson, of 1,000 feet. Watervliet was settled about the time when settlements were made at Albany and other places on the Hudson. It was incorporated as a village, and called West Troy in 1836. In August, 1897, it was chartered as a city under the name of Watervliet. Its industrial growth has been closely connected with the work of the government arsenal. It

has many of the social and educational advantages of Albany and Troy. Pop. (1910) 15,074.

WATER WHEEL: a device by which the motive energy in falling water is utilized to perform mechanical work. Water acts as a motive power by its weight, or by pressure and impact, and the water wheels adapted to these various conditions may be divided into two general classes—the 'vertical,' consisting of the 'overshot,' 'breast,' and 'undershot' wheels; and the 'horizontal,' which includes a great variety of turbine or reaction wheels. The impact or impulse wheels are included in both classes. The term water wheel is correctly applicable to all forms of water motors that rotate, but in the present case it will be restricted to those of the vertical class which are actuated mainly by the weight of water loaded on their circumferential parts. For those belonging to the horizontal class, see TURBINE.

The overshot wheel is provided with a number of buckets fixed to its periphery in such a way that as the wheel revolves from left to right the buckets on the descending side have their tops upward, and being filled with water at or near the top of the wheel, exerts a downward pull and imparts a rotary tendency to the wheel. The water is admitted to the wheel by various methods, such as the overfall sluice, the penstock, and the guide bucket, in all of which the water is guided in a course tangential to the buckets, and acts partly by impact, but principally by weight. To obtain the greatest efficiency, the number of buckets ought to be as large as possible and so arranged as to hold the water as long as practicable. The buckets vary in form, but the greatest effect is obtained from curved buckets, the 'radial' giving only about 75 per cent of the power obtainable by the use of 'elbow' buckets. Overshot wheels may be constructed of wood or iron in any size. The earlier forms were massive structures built of wood, and often measured 70 feet in diameter, but the modern wheels are generally built of iron and are practically limited by construction to falls less than 60 feet in height.

In the breast wheel the water is received by the buckets above the centre and below the top of the wheel. It is most effectively employed in connection with falls ranging from 5 to 20 feet, and where the flow ranges from 5 to 90 cubic feet per second. The buckets are generally held in a curb, and, not being required to hold water, are set radially. Their number is made as large as possible, and they are set at such an angle that they leave the water vertically so as not to carry up water from the tail-race. The breast wheel is more effective than the overshot under a variable water supply, since it can be made of a greater diameter and affords an

increased facility for the reception and discharge of the water by the buckets.

The undershot wheel receives the water below its horizontal centre line. Instead of buckets it is equipped with a series of paddles or vanes fixed to the periphery in such a way that the flowing water passes under the wheel, pushes against the paddles, causing rotation. It is usually set in a curb with a minimum amount of clearance for the escape of the water. The most effective curbs are concentric to the wheel, those set straight or tangential allowing too much waste. The paddles are set radially and inclined upward in order to be readily relieved of water upon the return side.

For falls not exceeding six feet the most effective wheel is the Poncelet. In it the water acts in a manner very similar to its action in a turbine, and although not quite as efficient as turbines working under normal conditions, it is superior when working under a reduced water supply. The buckets are curved, and the water flowing along their concave sides presses upon them without impact and with greater effect than that of water impinging at right angles against buckets with plane surfaces. The effect of the wheels increases with the depth of the water, and the velocity of rotation is equal to about one-half the velocity of the flowing water. The simplest form of the 'impact' wheel consists of a series of rectangular buckets fixed upon a wheel at an angle varying from 50 to 70 degrees to the horizontal. The water is conducted to it through a pyramidal flume set at an angle varying from 20 to 40 degrees, so that it strikes the blades nearly at right angles. The normal effect is about 5 per cent of the total mechanical power of the flow, but this may be increased somewhat by increasing the length of the paddles, so that the water exerts a combined impinging and pressing force.

In another form, known as the 'impulse' wheel, a series of cup-shaped buckets attached to the periphery of the wheel are acted upon by a jet of water conducted by a pipe and delivered through a nozzle tangently against the cups. Of this form the most notable are those of the Pelton type, which vary from 5 to 20 feet in diameter and are extensively employed to work air compressors in mining operations. A wheel of the maximum size is capable of developing 350 horse-power, under a 700-foot head of water.

In general, as compared with turbines, vertical water wheels are the more effective when applied to falls ranging from 20 to 40 ft. The turbines are more efficient with low falls, on account of the great hydraulic resistance developed by the very high falls, which increases as the square of the velocity. On the other hand, since turbines are run at a greater number of revolutions, they are more suitable to general mechanical purposes, while vertical wheels are better for purposes re-

quiring low velocities, and in the operation of rolling mills where the varying resistances are controlled by the mass of the wheel.

There is not much difference in the cost of construction, but the durability of the turbine is less than that of the vertical wheel.

Bibliography.—Good descriptions of water wheels are scattered through the various engineering periodicals. Especially valuable data may be obtained from Weisbach, *Hydraulics and Hydraulic Motors,* English translation by Du Bois (New York 1877); and Bjorling, *Hydraulics and Hydraulic Motors* (London 1894).

WATER-WORKS: systems of machinery and engineering structures, employed to supply water to individual manufacturing, mining, and milling plants, and to municipalities, for domestic and industrial uses. Such systems existed during very early periods of history, and the water-works of ancient Greece, Carthage and Rome may be readily traced and studied by the ruins of their reservoirs and masonry aqueducts. In these earlier systems, gravity was depended upon for the delivery of the water, but force pumps were introduced about the middle of the 16th century, and extended greatly the general application and use of water-works systems. Of these the water-works built at London Bridge by Peter Maurice 1562 appear to be the first. The installation consisted of 16 force pumps, each 17 inches in diameter, and 30 inches long, which were driven by a current wheel, and raised 311,000 gallons of water per day to a reservoir at an elevation of 120 ft. above the pumps, and from which the water was delivered by gravity, through lead pipes to buildings in the immediate vicinity.

In the United States, the first pumping plant installed to provide water for municipal purposes, was that at Bethlehem, Pa., about 1760. It consisted of a five-inch wooden force pump, which raised water to a height of 70 ft. through pipes of bored hemlock logs. This was replaced in 1761 by three single-acting iron pumps, each 4 in. in diameter, and of 18-inch stroke, operated by an undershot water-wheel. The first municipal water-supply system built in America, however, was that of Boston, in 1652. It was built by the Water-Works Company, and consisted of a reservoir about 12 ft. sq., to which the water from springs in the vicinity was conveyed through wooden pipes. From 1652 up to the close of the year 1800, the water-works plants in the United States numbered 16, and had been located and built at the following named cities: Boston, Mass., 1652; Bethlehem, Pa., 1754-1761; Providence, R. I., 1772; Geneva, N. Y., 1787; Plymouth, Mass., 1796; Salem, Mass., 1795; Hartford, Conn., 1797; Portsmouth, N. H., 1798; Worcester, Mass., 1798; Albany, N. Y., 1798-1799; Peabody, Mass., 1799; New York

city, 1799; Morristown, N. J., 1799; Lynchburg, Va., 1799; Winchester, Va., 1799-1800; and Newark, N. J., 1800. With the exception of the plants at Winchester and Morristown, they were all built by private concerns, but passed into the ownership of the respective municipalities from time to time up to 1860. The works at Winchester were built by the municipality, and those at Morristown were built by a private concern and still remain in private ownership. From 1800, up to the present time the number of plants installed throughout the country amounts to about 3,500, of which 1,900 are under municipal, and 1,600 under private control.

A clear and concise consideration of the subject of water-works may be facilitated by arranging the various requirements under the four general headings—quality, sources of supply, modes of distribution, and public policy.

Quality expresses the fitness of the water for the various purposes for which it may be required. A good quality of water is characterized by a freedom from turbidity and color, unpleasant taste and odor, and sewage contamination.

Turbidity is a condition caused by clay and silt suspended in the water. When the source of supply is a river, this condition is subjected to great variations according to the amount and character of the rainfall over the watershed. Heavy rains of short duration are drained off with great erosive effect, and introduce into the flowing rivers vast quantities of finely divided inorganic matter. This impurity, however, is more offensive than harmful, unless taken into the system frequently or in large quantities. It is removed by the use of large settling reservoirs where the water is allowed to rest and deposit the heavier particles, before it is passed over the filter-beds by which the smaller particles are removed. (See WATER SUPPLY.) Color is a condition still more offensive to the eye than harmful to the health. The apparent color due to turbidity disappears under the processes of sedimentation and filtration, but true color, generally due to infusion of vegetable organic matter, such as leaves, grass, etc., is much more difficult to remove.

Odor is a condition which, although less frequent, is much more harmful than turbidity or color. As a rule it is due to the life processes of minute organisms, and is removable to a considerable degree by filtration.

Sewage contamination is the most harmful of all the various forms of impurities natural or artificial that a water supply may be subjected to, and is the direct cause of epidemics of typhoid fever and various troubles of the intestines, which by undermining the constitution reduces its power of resistance to diseases. The water may be somewhat purified by filtration, but the proper method is to remove the source of pollution.

WATER-WORKS.

The quality of water is ascertained by various kinds of analyses, physical, chemical, and bacteriological, which, however, at their best, are only capable of indicating the probable safety or danger of a given sample of water. Physical analyses consist merely of comparisons of the given samples with standard solutions, and afford data relative to temperature, turbidity, color and odor.

Chemical analyses indicate the time of past contamination, and the nature of its origin—animal or vegetable. Bacteriological analyses are principally used to ascertain the absence or presence of the growths which cause bad taste and odor. Such analyses are capable of showing the number and probable origin of the bacteria present, but in matters of differentiation, as in the case of the typhoid germ from the harmless water bacteria, their operation is quite uncertain.

The results obtained by any set of analyses are generally interpreted by chemists and engineers by comparing them with other known facts, without attempting to establish a system of arbitrary standards. A minimum limit of impurity, however, may be stated, as follows:

(1) The best authorities consider water as bad or polluted when 100,000 parts of the liquid contain more than three parts by weight of mineral matter or one part by weight of dry organic matter, before it has been submitted to precipitation, or when it holds in suspension more than one part by weight of dry organic matter after 6 hours of perfect repose in a reservoir.

(2) When the same amount of liquid contains in solution more than two parts by weight of organic carbon, or three parts of organic nitrogen.

(3) If it exhibits a distinct color under daylight when placed in a white porcelain dish, to the depth of one inch.

(4) When 100,000 parts of the liquid contain more than two parts by weight of any metal except calcium, magnesium, potassium and sodium.

(5) When 100,000 parts of the liquid contain in solution, suspension, or chemical combination, more than 0.5 of metallic arsenic.

(6) When 100,000 parts of the liquid, after the addition of sulphuric acid, contain more than one part by weight of free chlorine.

(7) When 100,000 parts contain more than one part by weight of sulphur in the form of sulphuretted hydrogen, or a soluble sulphuret.

(8) When 100,000 parts of the liquid hold in suspension more than 0.5 of petroleum or hydrocarbon, or exhibit a film of the same upon its surface.

(9) When the acidity is greater than that produced by two parts by weight of hydrochloric acid to 1,000 parts of distilled water.

(10) When the alkalinity is greater than that produced by adding one part by weight of caustic soda to 1,000 parts of distilled water.

(11) When a cubic centimetre of water contains more than 250 bacteria.

In general, a large percentage of chlorine, and high nitrates, together with the presence of *coli communis*, a bacteria found in large quantities in the human intestines, indicates sewage contamination.

A very simple but reliable test for sewage contamination was suggested by Heisch. To half a pint of water placed in a clear colorless glass-stoppered bottle, add a few grains of the best white lump-sugar, and expose the bottle freely to daylight in the window of a warm room for a week or ten days. If the water remains clear, it may be considered safe, but if it become turbid, it is open to grave suspicion of sewage contamination.

Turbidity or a precipitate due to the addition of baryta water indicates the presence of carbonic acid; chloride of barium indicates sulphates; nitrate of silver indicates chlorides; oxalate of ammonia indicates lime salts; sulphide of hydrogen, slightly acid, indicates antimony, arsenic, bismuth, calcium, copper, gold, lead, mercury, platinum, silver and tin; an alkaloid by ammonia solution of sulphide of ammonium, indicates alumina, chromium, cobalt, iron, manganese, nickel and zinc. While the chloride of gold or mercury and the sulphate of zinc indicate organic matter.

Hardness of water is a quality that bears chiefly upon its use for washing purposes. The hardening impurities are principally the salts of lime and maguesia. Their carbonates produce temporary hardness which may be removed by boiling, when the carbonic acid is dissipated and the insoluble bases are deposited as incrustations on the bottoms of the kettles and boilers. The carbonates are less troublesome to the human constitution than to steam users, but the sulphates, chlorides and nitrates of lime cannot be dissipated by ordinary boiling and are productive of what is known as permanent hardness. Ordinarily pure water can take up only about 2 grains of carbonate of lime per imperial gallon of 70,000 grains, but when carbonic acid is present, that amount of water will dissolve as much as 20 grains of the carbonate. The degree of hardness is estimated according to the number of grains of soap the solution is capable of neutralizing. Thus, one, two, and three degrees of hardness represent the neutralization of 10, 20, and 30 grains of soap, respectively. The amount of waste, in the wear of clothes and soap, and the destruction of many valuable food properties by the use of hard water is not fully appreciated by the general public. It is safe to state that the money value of that waste far exceeds the cost that would supply an abundance of water for domestic purposes from a source free from impurities.

Systematic processes for softening water have been employed but rarely in the United States, and then principally in connection with the boiler and locomotive manufacturing plants. The first process was invented by Prof. Thomas Clark, of Aberdeen, Scotland, 1841, and consists of mixing the water supply with lime water or milk of lime, and allowing it to subside for a period ranging from 12 to 24 hours, when the water is drawn off while the precipitate is left behind. The only softening plant in connection with a municipal water supply in America is that attached to the water-works of the city of Winnipeg, Manitoba. The source of supply is a number of artesian wells, and the water obtained is of a very hard quality. The softening process employed is a modification of that of Clark, and includes a variety of settling and filtering devices, into which the water is pumped and mixed with the lime solutions and then drawn off and distributed by direct pressure pumping into the mains. Its working, although not satisfactory in many ways, provides a water more beneficial to the health, and superior for domestic purposes, than that of the Red river, which formed the original water supply of the city. (See WATER SOFTENING.)

While boiling is a very cheap and thoroughly effective process of purifying water, and may be used by householders in general, distillation, owing to its expense, may be employed only in special cases, in connection with artificial ice plants, the conversion of salt into fresh water at sea, and in the various industrial arts. It will be noted, however, that both boiled and distilled water are very unpalatable unless aerated before used for drinking purposes.

Sources of water-supply will be found extensively treated under that title. In a general way, the origin of all sources is the atmosphere. It is a simple matter to trace the course of the water from the clouds in the form of rain to the rivulets which form the feeders to the lakes and rivers, and which percolating through the porous rocks and earth, issue as sparkling springs along the valleys. Some special suggestions, however, relative to the selection of a potable water is advisable in this connection. In the open country water reaches the ground in a fairly pure condition, and by selecting a site isolated from the drainage of barnyards, house sewerage, and fertilized gardens, an excellent quality of water may be obtained from a well. Extending the application to where the supply is for the use of a community, town or small city, subterranean reservoirs in which the great rain percolations are stored up, may be tapped by artesian wells and furnish an inexhaustible supply of pure water. In boring these wells, however, a thorough knowledge of the geological structure of the region is important (see ARTESIAN WELLS), in order to

avoid unsuccessful and costly boring operations, as well as to obtain a sufficient quantity of water free from sub-surface impurities. Waters percolating through or over the crevices of granite, gneiss, serpentine, trappean, mica-slate or silicious sandstone and drift formations, are usually quite pure, since the disintegrations of such formations are not soluble in pure water. On the other hand, limestones and chalks impart objectionable qualities. Carboniferous rocks are often composed largely of mineral salts, and the water penetrating such strata are of a briny nature and are wholly unfit for domestic use. This is the case in the Kanawha valley, and in some parts of Ohio, West Virginia, and the State of New York. In the bituminous limestones of the oil regions of Pennsylvania, the waters passing through those strata are saturated with petroleum compounds, while the dark waters issuing from the sulphurous rocks of the Niagara group of the Ontario geological division carry a high percentage of sulphuretted hydrogen.

As the municipality requiring the water increases in size, the quantity obtainable from a source of supply becomes more and more important. The per capita consumption varies greatly and very often quite unexplainably. See WATER SUPPLY.

In the ancient cities of Jerusalem, Rome, Byzantium and Alexandria, the consumption amounted to 300 gallons per capita, daily.

In 1870, the water consumed by the principal European cities, in gallons per capita, was as follows: London 29, Liverpool 27, Glasgow 40, Paris 30, Marseilles 40, Genoa 30, Geneva 16, Madrid 16, and Berlin 18. On the other hand, it is not an unusual thing to find American cities consuming all the way from 100 to 250 gallons per capita. Without doubt, a great deal of the water in such cases is really wasted, but American hydraulic engineers in planning for a water supply under the present conditions, calculate upon the basis of a consumption of 100 gallons per capita, with provisions to meet an increased demand in the near future.

A fair average daily consumption may be approximately estimated as follows, in gallons per capita, on a basis of total population: For ordinary domestic purposes, 20 gallons; for private stables, including carriage washing, 3 gallons; commercial and manufacturing purposes, 16 gallons; fountains, drinking and ornamental, 10 gallons; fire protection, .2 gallon; private hose and sprinkling of streets and public grounds, during the four or five driest months of the year, 10 gallons; waste to prevent the freezing of water in the service pipes and house fixtures in northern cities, during the three coldest months of the year, 10 gallons; and waste by leakage, and for flushing purposes, 10 gallons; a total of about 80 gallons.

Thus for the larger cities, the selection of a source of

supply passes from the wells and springs to the large ponds and lakes. Important examples of such are found in the cities of Chicago and Milwaukee, which draw their supply from Lake Michigan, and Cleveland and Buffalo, from Lake Erie. In the majority of cases the principal cities of the world obtain their water from rivers, although a great many, as in the case of New York, which draws its supply from Croton Lake, have adopted certain natural basins and converted them by artificial means, such as dams, etc., into immense reservoirs, fed solely by the rainfall over the drainage area. In such places the principal mode of delivering the supply at the point of consumption is by gravity, through aqueducts, connecting the source of supply with the distributing mains. Intermediate settling and filtering reservoirs may be employed in connection with the source of supply to neutralize the conditions of turbidity, color, etc., inherent to surface waters, while auxiliary pumping stations may be built and operated in connection with standpipes if any part of the area using the water happens to be higher than the level of the source of supply.

On the other hand, when a river is the source of supply, its natural position in the lowest part of the valleys compels the elevating of its waters before delivery to the consumers. This is usually accomplished by pumping plants which elevate the water into reservoirs or standpipes from which it is distributed by gravity, or it is pumped direct into the distributing mains and thence into the service pipes. In either case, in planning a system of water-works, it is essential that proper provisions be made to insure a pressure of delivery that is constant and adequate to supply the consumption per capita for all domestic and industrial purposes, and of sufficient power to throw fire streams over the tops of ordinary buildings. A combination of the gravity and pumping systems is employed by the city of Washington. From the Great Falls of the Potomac, situated several m. w. of the city, the water is conveyed through a conduit to receiving reservoirs on the heights adjacent to the city and after a period of subsidence is passed into the distributing reservoirs and thence to the service mains. Certain portions in the n.w. and n.e. parts of the city being higher than the receiving reservoir, pumping stations connecting with the distributing mains pump the water into standpipes in the elevated sections, from which it is delivered to the consumers by gravity. As a rule, the cost of establishing pumping systems to lift the water from the river from a point near at hand to the standpipes, is far less than that of building the necessary aqueducts to conduct the water from a point on the river a sufficient distance beyond to insure the required head or pressure. In the case of Washington, however, the arrangement is practically necessary since

the sewage of the city flows into the river in the immediate vicinity, and the current of the river itself is affected by the ebb and flow of the tide to some distance above the city, so that the water immediately at hand is in a polluted condition. In this connection it may be mentioned that but a very small number of American cities are fortunate enough to obtain an abundant supply of water directly from natural sources sufficiently transparent and limpid for domestic purposes. The great majority are compelled to resort to artificial means of various kinds, such as storage and settling reservoirs, filter beds, and pumping plants, to insure the purity and quantity required.

The character of 'pumping plants' varies according to the source and mode of supply, the motive power employed, and the working pressure on the pumps. In connection with the source and mode of supply, such plants are arranged for direct pumping, or for pumping into a reservoir. Direct pumping plants are liable to be affected by great and sudden changes in working pressure and therefore require machinery capable of responding quickly to such changes, with strong and simple working parts automatically regulated under variable speeds. On the other hand, since the machinery employed to pump into a reservoir works against an almost constant head or pressure, at a practically uniform rate of speed, a much greater latitude is presented in the economy of design and operation.

As a general rule, when the source of supply is more than 25 feet below the surface of the earth, economy in the matter of excavations and foundations compels the use of some form of a vertical rather than a horizontal pump. If the well is very deep two sets of pumps, one at the bottom and one at the surface, may be employed, or by the use of the air lift, the motive power may be kept at the surface of the ground. On the other hand, when the water has to be pumped from a river to a settling reservoir for purification, and then re-pumped into the distributing mains, under conditions involving a comparatively low lift, some form of horizontal or centrifugal pump is the most suitable.

Relative to motive power, it is evident that water power, when it can be obtained in a sufficient amount, is the ideal source of energy, since it is generally inexhaustible and always cheap. If, however, it cannot be obtained during the whole year, it may be supplemented by steam or electric power, or by a system of storage reservoirs arranged to equalize the flow of the stream under the varying conditions of wet and dry seasons. The employment of steam, electric and compressed air power to operate pumping plants depends to a great extent upon the cost of fuel used. When the pumping plants are situated at points far from the fuel supply, they may be operated economically, within the limits of economical

electric power transmission, by power derived from dynamos driven by steam-engines or the energy of water-falls. Compressed air may be used to operate small plants located at a distance from the main plant, and also to operate air lifts where deep wells are the source of supply, while oil and gas engines are the most economical for operating isolated secondary pumping plants in large cities, or the main pumps of small towns and villages. It is a fact, however, that in a majority of the water-works throughout the world, steam is the motive power employed, the pumping engine usually combining the motive power and pump action in one machine. They are of several different types, and the adoption of any particular one depends practically on the cost of the fuel used. When that cost is great, high duty engines, although more expensive in design and construction, but capable of performing a relatively larger amount of work with a small amount of fuel, are adopted.

For specific information on the construction of reservoirs, filter beds, tanks and standpipes see WATER SUPPLY. In general, the most important point to be considered in planning a system of water-works, is that of procuring an ample and suitable supply of water. To insure this, natural bodies of water, such as ponds and lakes, are connected with reservoirs by dams across their outlets, or by large masonry structures, partially in excavation and partially in embankment, from which reserve supplies of water are drawn off into the distributing system to maintain a constant pressure under varying demands. Tanks and standpipes are practically small reservoirs, usually located above the ground, on wooden, steel, or masonry towers. Their specific application has been described in connection with pumping plants.

Standpipes placed upon the force mains are employed by several American cities, whose reservoirs are distant from their pumping stations to equalize the resistance against the pumps. Those at Louisville, Milwaukee and Saint Louis are examples. Other cities, such as Chicago and Toledo, where proper reservoir sites are unattainable, use open-topped standpipes of considerable height, ranging from 150 to 275 feet. They serve as partial substitutes for relief valves acting in conjunction with tall air chambers. In the standpipes the surface of the water rises and falls according to the rate of delivery into them by the pumps and the rate of draft when the main over which they are placed is connected with the distributing system. In northern cities they have to be housed to prevent the water from freezing during the winter.

The water obtained by any of the methods already described is supplied to the consumers by distributing systems comprising the various kinds of mains, service pipes, house fixtures, valves and hydrants which control the flow and the delivery of the water, while various

kinds of meters record the amount consumed and afford a basis for taxation. See WATER METERS.

Such systems often include distributing reservoirs, tanks, and standpipes, and sometimes auxiliary pumping plants. They usually consist of one or more trunk mains from which numerous branch pipes, continually diminishing in size, lead through under the surface of the streets and connect with the various buildings. The mains are usually of cast iron, although wooden pipes have been and are even at the present time used under certain conditions. Under a direct pressure system, when the water is pumped through such a pipe, it is called a force main. Originally they were of wrought iron, but proving unreliable were superseded by cast iron and finally by those of riveted steel.

The size of water mains depends upon the required volume and velocity of the water conveyed, and vary from 48 to 72 in. in diameter. Pipes leading to fire hydrants should not be less than 4 in. in diameter, and when of that size should be restricted to lengths not exceeding 300 or 400 ft. and leading to a single hydrant. Service pipes are usually of lead or wrought iron. Lead pipes, although more expensive, are preferable on account of their flexibility, smooth interior surface, great durability, and relative non-corrosiveness. Plain wrought-iron and galvanized-iron pipe corrodes so rapidly that it is unfit for use unless coated both inside and outside by asphaltum or varnish of some kind. Various substances have been applied for that purpose from time to time, while interior linings of cement have been used extensively; but the present practice is confined to the application of an asphaltum bath, with perhaps the most satisfactory results obtainable. It consists simply of a mixture of coal tar and asphaltum in proportions that will give a coating non-brittle at the freezing point.

Valves are employed to control the water as it flows into the mains and from them into the service pipes. Pipes are always liable to accident through excavations for buildings, sewers, electric conduits, overflows, and quicksand and clay slides. It is also very often necessary to shut off the water when new hydrants are attached, or when large pipe connections or repairs are made. Under such circumstances means to maintain a constant supply at and beyond the points involved are best obtained by a duplicate arrangement of sub-mains in parallel lines at several squares distance, joined across by a system of smaller service mains, so that there are always at least two lines of sub-mains around any given point. Under such conditions stop-valves may be used with advantage to shut off the water from a particular point without cutting off the supply from what may be a large territory lying beyond. Stop-valves are made in a great variety of forms, but the best have double self-adjusting disks, with the seats slightly divergent, so that

the pressure of the screw sets the valve-disks snug upon the seats. They are usually located on the mains under some invariable system so that they may be readily found in case of accident when hidden by a cover of frozen earth, snow, or other debris. Blow-off and waste valves are attached to pipes laid upon undulating ground, and are used to flush out the sediment deposited from unfiltered water, in the principal depressions of mains and sub-mains. Their diameters are usually about one half that of the mains from which they branch and they may be led into sewers or wherever the waste water may be disposed of. Valves commonly known as corporation cocks regulate the flow into the houses and are usually set near the curb. Check valves act against a backward flow of water and are useful on force mains to protect the meters against back pressure, while reducing valves are employed to relieve depressed areas of a city from excessive pressure where an effective division into high and low service is impracticable. They operate automatically, under the hydraulic pressure in the mains in which they are located, while the other forms are operated by hand or may be operated by electrical connections. Valves are expensive contrivances, and the cost of the larger sizes may be often reduced by the application of the Venturi principle, the larger pipes being gradually contracted to the size of a small valve, and then gradually increased to the original size without much loss of pressure.

Hydrants are valves used for fire-fighting and flushing purposes. In post or fire-hydrants, a vertical tube extends from the valve to a certain height above the ground. They are usually set on a branch pipe, at or near the curb line, and may be provided with from one to four nozzles, according to the capacity of the service mains, for the attachment of fire-hose. They are made in an innumerable variety of patterns; a first-class hydrant, however, consists of a frost case that is free to move up and down as the ground expands and contracts under varying temperatures, without straining the hydrant base; a waste valve that will drain the hydrant effectually as soon as the main valve is closed, and which will close automatically as soon as the main valve begins to open; a main valve that is positively tight, which if it closes 'with' the pressure will be free of any slack motion of its stem and thus prevent a severe water-ram at the moment it is closed; a screw motion of the valves requiring at least ten complete revolutions before the valves are seated, thus insuring a slow closing and preventing the excessive shock and strain on the valves of an entire system that may result from a water-ram caused by the simultaneous closing of several hydrants. A stop-valve is usually placed between the main and the hydrant, so that the latter may be repaired without shutting off the flow through the mains. Hydrants should not be placed

more than 500 ft. apart, while in a closely built business district they may be placed at very close intervals.

Waste by leakage from the mains, and poorly constructed flushing devices, varies from 5 gallons upward per capita, and its reduction to a minimum is essential to the economical operation of any system of water-works, but it is especially important when the source of supply is distant and the purity of the water depends upon the conservation of its quantity. This can only be accomplished by careful workmanship in the construction of the plant; careful pipe laying; the use of high-grade, self-closing plumbing fixtures, especially those devices used for flushing water-closets, and the installation of meters not only to detect leaks and other causes of waste in the houses, but to form the basis for charges against the consumer and compel carefulness on his part. This, however, brings the matter to a point where it is necessary to harmonize good practice with public policy. The details of district meter systems, and the inspection of service pipes are minor problems as compared with the equitable adjustment of water rates according to the various classes of consumers. In general, although the district plan is but a poor competitor of the house meter system, it has produced good results in controlling waste and detecting leaks whenever it has been employed, and is worthy of more careful consideration, and extensive application in the various water-works systems throughout the United States. See also RESERVOIR; DAM.

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WATER WORSHIP: a feature of nature worship, and one of the primitive superstitions of mankind. Water was not worshiped as an element, but in its various forms of well and spring, river and ocean. Every spring and river was supposed to have an animating diety, who could be propitiated or offended, and the worship of these divinities was a prominent part of Greek and Roman cult, especially in the rural districts.

WA'TERY GRIPES: popular name for a form of serous diarrhœa occurring in infants, in which there are copious discharges, thin and watery, often limpid or almost colorless, and occasionally intermixed with flakes or

shreds. This form of diarrhœa may be induced in weakly children by sudden impressions of cold on the surface checking perspiration; or it may be brought on by cold drinks when the body is heated. The exhaustion by the copious excretions from the bowels is sometimes so great that the case might be mistaken for one of cholera. The child thus attacked should at once be wrapped in warm flannel, placed in bed, with a bag of hot dry bran over the belly; and some arrowroot, with a little brandy, given frequently in teaspoonfuls or larger doses according to age; and a physician should be at once sent for. If medical aid cannot be readily procured, opium must be carefully used to check the evacuations: one of the best preparations is aromatic powder of chalk and opium, every 40 grains of which contain 1 grain of opium. From 3 to 5 grains of this powder, with a quarter of a grain of ipecacuanha, may be given, and repeated every three or four hours for two or three times, unless any head-symptoms (due to the opium) are perceived.

WATFORD, *wŏt'fĕrd:* market-town, county of Hertford, England; on the banks of the Colne; 18 m. n.w. of London by rail. Straw-plait is manufactured, and silk-spinning and malting are carried on; and there are two large paper-mills. Pop. (1881) 10,073; (1891) 10,300.

WATKINS, *wŏt'kĭnz:* village, cap. of Schuyler co., N. Y.; at the s. end of Seneca Lake; 22 m. n. of Elmira, 76 m. s.s.e. of Rochester. It contains 5 churches, Watkins Acad., 2 public libraries, 6 hotels, several iron foundries, steam flour-mills, tannery, boot and shoe factories, and 3 weekly newspapers. Near it is the famous Watkins Glen, a deep, picturesque ravine extending several miles from the head of the lake, and containing numerous cascades, some with a fall of 60 ft., and a series of rocky arcades, galleries, and grottoes. The principal attractions are Rainbow Falls, the Cathedral, Glen Alpha, and the Well. The Glen is visited by many thousand people every season.—Pop. of village including Readingtown (1900) 2,943; (1910) 2,817.

WAT'KINS, Samuel: 1794-1880, Oct. 16; b. Campbell co., Va. His parents died when he was an infant, and his early life was one of abuses and hardships. After working on a plantation for several years, he entered the U. S. army and served under Gen. Jackson against the Creek Indians and in the battle of New Orleans. After peace was declared he settled at Nashville, Tenn., and became a brickmason, and subsequently a master-builder, and wealthy; but much of his property was destroyed in the civil war, his farm of 600 acres being the battle-field of Nashville. He bequeathed $130,000 for a polytechnic institute at Nashville, erected 1882, and provided for the establishing of courses of free public lectures, and classes in mathematics, for those without the advantages of schools and colleges.

WATKINSON, *wŏt'kĭn-son,* DAVID: philanthropist: 1778, Jan. 17—1857, Dec. 13; b. Lavenham, Suffolk, Eng. His early education was directed by the famous Mrs. Barbauld; but when 17 years of age he removed with his parents to this country, and settled at Middletown, Conn. He received a commercial training in a counting-house in New York, and in 1800, in partnership with his brother William, engaged in mercantile business in Hartford, Conn. In 1841 he retired with a large fortune. He bequeathed $40,000 to the Hartford Hospital, $20,000 to its orphan asylum, $40,000 toward establishing a juvenile asylum and farm-school for waifs, and $100,000 to the Conn. Historical Soc. for a reference library in Hartford, called the Watkinson library.

WATLING'S ISLAND, *wŏt'lĭngz:* small island of the Bahama group (see BAHAMAS), now believed to be the true island of San Salvador (q.v.), which was the first American land seen by Columbus. Cat Island was till recent years regarded as the memorable island of San Salvador.

WATLING STREET, *wŏt'lĭng strēt:* one of the great Roman highways of Britain, beginning at Dover, passing through Canterbury and Rochester to London, thence through Uriconium and Chester to Caer-Seiont, the anc. *Segontium,* in Caernarvonshire. From Uriconium a branch proceeded n. by Manchester, Lancaster, and Kendal, into Scotland. Traces of the ancient road are still visible in many parts of its course, and in some it is still an important highway. A street in London retains its name. The origin of this name is uncertain.

WATSEKA, Ill.: city, county-seat of Iroquois co.; on the Iroquois river, and on the Chicago and E. I. and the Toledo, P. and W. railways; about 70 m. s. of Chicago and 100 m. e. of Peoria. It is in an agricultural and stock-raising region. The chief manufacturing establishments are flour and grist mills, planing mills, knitting mills, tile works, and machine shops. There are seven churches, public elementary schools, and two banks. Pop. 2,590.

WATSON, *wŏt'son,* ELKANAH: projector and promoter of public improvements: 1758, Jan. 22—1842, Dec. 5; b. Plymouth, Mass. He was serving as apprentice in a mercantile business in Providence, R. I., when Gen. Washington took command of the army around Boston; and Watson took charge of transporting to Cambridge, Mass., 1½ tons of gunpowder. He made a tour of 'mercantile prospecting' among the seaboard cities of the southern states 1777; his journal of the tour, which he published, is the best contemporary evidence as to the condition of the principal towns of that region at that date. He was bearer of dispatches to Benjamin Franklin in Paris 1779, and thereafter for 3 years was engaged in mercantile business at Nantes; then spent some time in England,

Holland, and Flanders, returning to Newport, R. I., 1784. He visited Washington at Mt. Vernon, and there spent 'two days, the richest of my life;' their discourse was chiefly of improving the navigation of the Potomac. The next few years he was engaged in trade between Charleston, S. C., and Hayti. He settled in Albany, N. Y., 1789, and there labored to promote many enterprises of great general utility—e.g., improvement of the navigation of the Hudson, a great canal from the Hudson to Lake Erie, stage routes to the west, advancement of education and agriculture, paving of the streets of Albany. He published an account of a tour of the state of N. Y., made while exploring routes for projected canals. He settled at Pittsfield, Mass., as a farmer 1807, and there founded the Berkshire Agricultural Soc. Returning to Albany 1816, he organized an agricultural soc. there—the first in the state of N. Y. From 1828 till his death he studied and practiced scientific agriculture at Port Kent, N. Y. He published, besides the journals of travel above mentioned, a journal of a *Tour in Holland* (1790); *Hist. of the Rise, Progress,* etc., *of the Canals in the State of N. Y.* (1820); *Rise, Progress,* etc., *of Agricultural Societies* (1820), and many pamphlets. See *Men and Times of the Revolution, or Memoirs of Elkanah Watson,* containing his journals and correspondence edited by Winslow C. Watson (New York, 2d ed. 1856).

WAT'SON, James Craig, ph. d., ll.d.: astronomer 1838, Jan. 28—1880, Nov. 23; b. Fingal, Canada; son of parents both natives of the United States. He graduated at Michigan Univ. 1857. Having made a special study of astronomy and become familiar with details of observatory work, he was appointed assistant in the ovservatory at graduation, and, 1859, asst. prof. of astronomy; he was prof. of physics 1860, but returned to the dept. of astronomy 1863, as director of the observatory; became prof. of astronomy and director of the observatory in the Univ. of Wisconsin 1879. While still an undergraduate at Ann Arbor, Watson discovered a comet, and the year of his graduation, 1857, Oct. 20, discovered independently an asteroid found a few days earlier by another observer. He computed the elements of Donati's comet 1858, and his results are regarded by astronomers as authoritative. His discoveries of planetoids, asteroids, or minor planets are very numerous: in one year (1868) Watson added to the list of such bodies Hecate, Helena, Hera, Clymene, Artemis, and Dione.

WAT'SON, John, d.d. (pen-name, Ian Maclaren): British author; b. 1850, Nov. 3, at Manningtree, Essex, Eng.; d. 1907, May 7. He was of Scotch ancestry on both father's and mother's side. At the time of the author's birth his father was an officer of excise in Essex, Eng., whence he soon removed to London, where he remained several years; but the forming years of the son's

childhood were spent in Scotland, first at Perth, later at Sterling, with summer visits to two uncles who were farmers at Blairgowrie and Meigle. His father was an elder in the Free Church of Scotland. Watson studied at Edinburgh University, then at New College, Edinburgh, and became a minister of the Free Church, settled first at Logiealmond, Perthshire—the 'Drumtochty' of his stories—then at Glasgow, and later at Sefton Park Presb. church, Liverpool, where he still remains. In 1894 he issued the series of Scotch stories called *The Bonnie Brier Bush,* followed by *Days of Auld Lang Syne, Kate Carnegie,* and other tales and sketches. He has also published some distinctively religious writings. In the autumn of 1896 he visited America, to deliver at Yale University the Lyman Beecher course of lectures on preaching, since published under the title *The Cure of Souls.* On the same visit he gave readings from his stories in many cities of the United States and Canada. He was again visiting America when he died at Mt. Pleasant, Iowa.

WATSON, JOHN: Canadian philosopher: b. Glasgow, Scotland, 1847, Feb. 25. He was graduated from Glasgow University in 1872 and in the same year was called to the chair of mental and moral philosophy at Queen's University, Kingston, Ont. He has published *Kant and His English Critics* (1881); *Schelling's Transcendental Idealism: a Critical Exposition* (1882); *The Philosophy of Kant as Contained in Extracts from His Own Writings* (1888); *Comte, Mill, and Spencer, an Outline of Philosophy* (1895); *Hedonistic Theories, from Aristippus to Spencer* (1895); *Christianity and Idealism* (1896); *An Outline of Philosophy with Notes Historical and Critical* (1898).

WATSON, JOHN CRITTENDEN: American naval officer: b. Frankfort, Ky., 1842, Aug. 24. He was graduated from the United States Naval Academy in 1860, was promoted master in 1861, and assigned to the *Sabine.* He was transferred to the *Hartford,* flagship of Admiral Farragut, in 1862, and served under him throughout the war. He participated in the battles of Fort Jackson and Saint Philip, served in the passage of the Vicksburg batteries in 1862, of Fort Hudson in 1863, and was engaged at Mobile Bay in 1864. He received rank as lieutenant-commander in 1866, as commander in 1874, and in 1877-80 was in command of the *Wyoming.* He was lighthouse inspector in 1880-6, promoted captain in 1887, and commodore in 1897. In the Spanish-American war of 1898 he commanded the blockading squadron on the northern coast of Cuba, was transferred to the command of the *Oregon* later in that year, and in 1899 succeeded Admiral Dewey in charge of the Asiatic squadron at Manila, with rank as rear-admiral. In 1900-2 he was president of the naval examining board, and president of the examining and retiring board 1902-4. He was retired 1904, Aug. 24.

WAT'SON, Richard: Methodist minister: 1781, Feb. 22—1833, Jan. 8; b. Barton-upon-Humber, Lincolnshire, Eng. At 14 years of age he was apprenticed to a carpenter, but had previously learned considerable Latin and Greek. When 15 years old he became a Methodist, and was licensed by the church to preach. He was released from his apprenticeship, was ordained at 19, and devoted the rest of his life to fervent labor as a preacher, and diligent authorship in behalf of the doctrines of his church. In 1800 he published *Apology for the People called Methodists.* He was for some time editor of the Liverpool *Courier;* was author of *Theological Institutes, The Life of John Wesley, A Biblical and Theological Dictionary,* and *An Exposition of the Gospels of Matthew and Mark.*

WAT'SON, Richard, D.D.: bishop of the Church of England: 1737-1816, July 2; b. Heversham, Westmoreland. He was educated at Cambridge, where he became prof. of chemistry 1864; when appointed he knew almost nothing of the science, but in a few months became proficient. In 1771 he became regius prof. of divinity—a subject which he had not till then very diligently studied; and was soon known as an ingenious, eloquent, and copious author of theological works. He obtained several livings, was archdeacon of Ely, and 1782 became bishop of Llandaff. Besides innumerable sermons, addresses, essays, and charges, he published a famous *Apology for Christianity, in a Series of Letters Addressed to Edward Gibbon, Esq.* (1776); *An Apology for the Bible* (1796). His liberal sentiments in matters civil and ecclesiastical caused his orthodoxy to be questioned by some in his lifetime. His autobiography, *Anecdotes of the Life of Richard Watson,* was published by his son 1817.

WATSON, Robert Spence: English publicist and lawyer: b. Gateshead 1837, June 8. He was educated at University College, London, and established a law practice in Gateshead and Newcastle. He was president of the National Liberal Federation in 1890-1902, and has taken an active part in educational movements in Newcastle. He is also known for his writings on economic subjects, particularly the labor question. His publications include *Industrial Schools* (1867); *Higher Education in Boroughs* (1868); *The History of English Rule and Policy in South Africa* (1879); *Irish Land Law Reform* (1881); *The Relations of Labor to Higher Education* (1884); *Boards of Conciliation and Arbitration and Sliding Scales* (1886); *The Peaceable Settlement of Labor Disputes* (1889); *Labor, Past, Present, and Future* (1889); *The Recent History of Industrial Progress* (1891); *The Duties of Citizenship* (1895); etc.

WATSON, Sereno: American botanist: b. East Windsor Hill, Conn., 1826, Dec. 1; d. Cambridge, Mass., 1892,

Mar. 9. He was graduated from Yale in 1847, studied medicine at the University of New York, and in 1867-9 was botanist to the government exploration of the 40th parallel under Clarence King. In 1871 he became assistant curator at the Gray Herbarium at Harvard, and from 1874 until his death was curator there. He was elected fellow of the National Academy of Sciences in 1889. Among his publications are: *Botany*, Vol. V. of *Reports on the Geological Exploration of the Fortieth Parallel* (1871); *Bibliographical Index to North American Botany, Part I., Polypetalæ* (1878); with W. H. Brewster and Asa Gray, *Botany of California* (2 vols., 1876-80); etc.

WATSON, Thomas: English poet: b. London about 1557; d. 1592. While his fame may seem to have been eclipsed by that of Spenser and Sidney, among his contemporaries he was equally popular for his pastoral and love poetry. He lived in a learned age and translated the *Antigone* of Sophocles into very elegant Latin. His *Melibœus Thomæ Watsoni; seu, Ecloga in Obitum Domini Francisci Walsinghami, Equitis Aurati* (1590) was a graceful Vergilian tribute to the memory of the statesman and diplomat, Francis Walsingham (q.v.). His sonnets, *Tears of Fancie; or Love Disdained*, evidently gave suggestions to Shakespeare in the composition of his *Sonnets*. Consult Arber, *English Reprints* (1892).

WAT'SON, Thomas E., politician and journalist: b. Columbia co., Ga., 1856, Sept. 5. After receiving a common-school education, he studied at Mercer University at Macon; leaving college for lack of funds in his sophomore year, he supported himself for several years by teaching school, studying law in the meantime. He was admitted to practice 1876, and opened an office in Thomson. He served in the Georgia legislature 1882-3. In 1890 he was elected to congress as a democrat, and was defeated twice afterward as a populist. In the presidential campaign of 1892 Watson published a book in which he made grave charges against the character and qualifications of members of the United States house of representatives, alleging that many of them were drunken, extravagant with public funds, etc. A committee of the house was appointed to investigate the charges, which were not sustained. At the national nominating convention of the People's party held in St. Louis, Mo., 1896, July 22-25, resulting in the nomination of William J. Bryan (who was also the nominee of the democratic national convention at Chicago) for the presidency, Watson was nominated for vice-president. In 1904 he was nominated by this party for president, and in 1908 for the same office by the populist party. He has published *Watson's Jeffersonian Magazine*, and *The Weekly Jeffersonian* since 1906, and has also written *The Story of France* (1898); *Life of Napoleon* (1902); *Life and*

Times of Thomas Jefferson (1903); *Bethany, a Study and Story of the Old South* (1904).

WATSON, WILLIAM, S.B., PH.D.: American scientist: b. Nantucket, Mass., 1834, Jan. 19. He was graduated from the Lawrence Scientific School of Harvard in 1857; was an instructor there in 1857-9; in 1859-63 was in Europe collecting information on technical education, which, when communicated to W. B. Rogers, was made the basis of the organization of the Massachusetts Institute of Technology; and from 1865 to 1873 was professor of mechanical engineering and descriptive geometry in that institution. In 1884 he was elected secretary of the American Academy of Arts and Sciences. In addition to numerous technical papers, he has published various writings, including: *Technical Education* (1872); *Course in Descriptive Geometry* (1873); *Courses in Shades and Shadows* (1889); *The Civil Engineering, Architecture, and Public Works of the Paris Exposition of 1889* (1891); and *The International Water Transportaiion Congress, Chicago, 1893* (1894).

WATSON, WILLIAM: English poet: b. Burley-in-Wharfedale, Yorkshire, 1859, Aug. 2. He was privately educated, and in 1880 published his first volume of verse, *The Prince's Quest, and Other Poems*, which showed the influence of Keats and William Morris, and found favor with Rossetti. In 1884 he issued his *Epigrams of Art, Life, and Nature*, containing much highly-finished work, but it was not till the publication of *Wordsworth's Grave, and Other Poems*, in 1890, that he gained adequate recognition. The volume of his *Poems* published in 1892 was a reprint of the 1890 volume with the addition of 26 new pieces. Of *Lachrymæ Musarum, and Other Poems* (1892), the title-poem is a fine eulogy of Lord Tennyson. *The Eloping Angels* followed in 1893, *Odes, and Other Poems* in 1894, and *The Father of the Forest, and Other Poems* in 1895. To 1896 belong two volumes of sonnets on the Armenian atrocities, with the titles *The Year of Shame* and *The Purple East;* to 1897, *The Hope of the World, and Other Poems.* His *Collected Poems* (1898) ought rather to be called *Selected Poems*, since from them are excluded all of the 1880 and 1893 volumes, more than half of the *Epigrams*, most of *The Year of Shame*, and portions of the other volumes. He wrote in 1902 one of the mort prominent odes on the coronation of Edward VII., and in 1903 *For England.* He has written in prose a volume of literary essays, *Excursions in Criticism* (1893). Watson's work is carefully wrought, reflective in tone, and marked by an air of distinction. It has been sometimes criticised as occasionally too closely an echo of greater poets. He was prominently mentioned as a possible successor to Tennyson in the laureateship.

WATSONVILLE, Cal.: city in Santa Cruz co.; on the Pajaro river, and on the Southern Pacific railroad; about

5 m. from Monterey Bay, an arm of the Pacific Ocean, and 18 m. s.e. of Santa Cruz. It is in an agricultural and fruit-growing region. Sugar beets are one of the chief products grown in the vicinity. The principal manufacturing establishment is the sugar beet factory, which has a beet-crushing capacity of over 1,000 tons and a sugar manufacturing capacity of over 200 tons each day. There are four state banks, capitalized for $180,000, and with deposits amounting to $1,468,000. Pop. (1890) 2,885; (1900) 3,085; (1910 est.) 3,250.

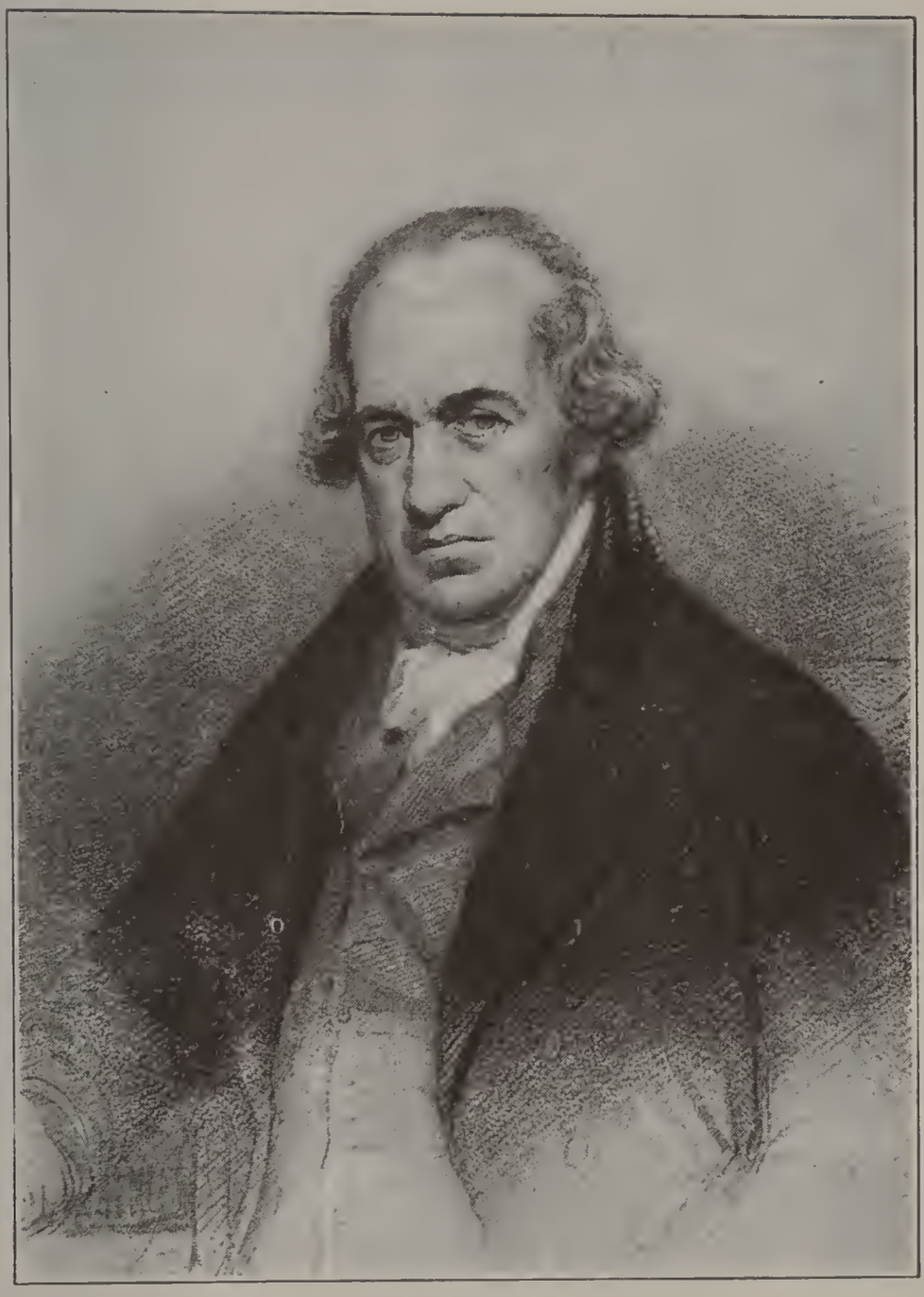
WATT. See UNITS, SCIENTIFIC.

WATT, *wŏt*, JAMES, LL.D.: mechanician, engineer, and man of science, famous as improver and almost inventor of the steam-engine: 1736, Jan. 19—1819, Aug. 19; b. Greenock, Scotland.

James Watt was weakly as a child, and unable to go to school with regularity. He early showed a turn for mathematics and calculations, and great interest in machines: accordingly, as his father's business had greatly declined, he was, at the age of 18, sent to London, to learn the trade of a mathematical instrument maker. Ill health compelled his return about a year afterward; but he had made good use of his opportunities in London; and he resolved to set up as a mathematical instrument maker in Glasgow. The incorporation of hammermen of that city put difficulties in his way; but the authorities of the university appointed him mathematical instrument maker to the university, and gave him the use of premises within their precincts 1757-63. He had to eke out his income by making or mending fiddles (though he had no ear for music), or doing any mechanical job which came in his way; and no work requiring ingenuity or application of scientific knowledge seems to have come amiss to him. In 1767 he was employed to make the surveys and prepare the estimates for a canal projected to unite the Forth and the Clyde: thus he made a beginning as a civil engineer. He made surveys for various canals, for improvement of the harbors of Ayr, Port Glasgow, and Greenock, and for deepening of the Forth, the Clyde, and other rivers. In his surveys he made use of a new micrometer, and of a machine, also of his own invention, for drawing in perspective—the latter of which appears to have been for several years about this time one of his sources of income.

While living in the college at Glasgow, in constant intercourse with the professors of the university, with access to books, and with much unemployed time on his hands—having, too, a great love of knowledge, and a lively interest in mechanical novelties—Watt had been a diligent experimenter in the application of science to the arts. In the winter of 1763-4 he began the investigations which ended in his improvement of the steam-engine. A working model of the Newcomen engine, kept for use of the natural philosophy class in the college, was sent to

him for repair, which Watt quickly affected. But in doing this he became greatly impressed with the defects of the machine. The Newcomen engine (see STEAM-ENGINE) was still but little used, and only for pumping water out of mines. It was cumbersome, and it required so much fuel that its expense must always have restricted its use. It was not properly a steam-engine: it was worked by the atmospheric pressure; steam being used only in producing, by its condensation, a vacuum in a cylinder, into which—the vacuum made—a piston was depressed by the pressure of the air. The steam issuing from a boiler was admitted into the cylinder until it filled it, when the supply was cut off by a self-acting cock; and then the steam was condensed in the cylinder by means of a jet of water. The water so greatly cooled the cylinder that the greater part of the steam at each stroke of the piston was wasted in heating its walls; and, on the other hand, much of the injected water was heated to the boiling-point, and gave off steam, which resisted the descent of the piston. Watt found that about four-fifths of the steam, and consequently of the fuel, was wasted; and he saw that to make the machine work economically two apparently incompatible conditions must be obtained—first, that the walls of the cylinder must constantly be of the same temperature as the steam which came in contact with them; second, that the injected water must never be heated up to 100°, the boiling-point *in vacuo*. He experimented on the conducting power of various substances, and made trial of a cylinder of wood steeped in oil; but with this cylinder, though it cooled less rapidly than a metallic one, there was still great waste of steam. Constantly, from the end of 1763, occupied with the subject of steam, he at length, early in 1765, hit on the expedient which solved all his difficulties— the separate condenser, an air-exhausted vessel, into which the steam should be admitted from the cylinder, and there condensed. The separate condenser at once prevented the loss of steam in the cylinder which had arisen in the process of condensation; and there was no difficulty in keeping it cool, so as to prevent the undue heating of the injection-water. He had now a thoroughly economical engine on Newcomen's principle, but he did not rest content with this—he resolved to make steam his motive-power. Closing the cylinder at both top and bottom, and connecting the piston with the beam, to which it was to communicate motion, by a piston-rod passing through a stuffing-box, he admitted the steam by suitable valves alternately above and below the piston, to push it downward and upward in turn; and this done, his invention was substantially complete. He had at last made a real steam-engine, capable of being worked with a comparatively small expenditure of fuel, and of yielding any desired amount of power. Comparing his invention with the atmospheric engine of New-



JAMES WATT.

comen, shows why the popular voice has awarded him the name of inventor of the steam-engine.

In 1773 Watt formed a partnership with Matthew Boulton, of Soho, near Birmingham, and the manufacture of the new engine was commenced at the Soho Iron Works. A patent for his invention had been taken by Watt 1769; and he got from parliament 1775 a prolongation of his patent for 25 years.

The new engine soon superseded Newcomen's machine as a pumping-engine. Watt afterward made numerous improvements in its construction (for the most important of which, see STEAM-ENGINE); and, with his partner Boulton, he immensely improved the quality of the workmanship in building engines and other machines. In 1781, 82,84,85, he obtained patents for a series of inventions —among them, the sun and planet motion, the expansive principle, the double engine, the parallel motion, and the smokeless furnace, of most of which the chief purpose was to make steam-pressure available for turning machinery in mills. The accomplishment of this—extending the application of the new power to the arts—was of scarcely inferior importance to the invention of the steam-engine itself. The first contrivance invented by Watt for this purpose was lost to him through the treachery of a mechanic who had been employed in making the model, who sold it to a manufacturer named Prickards, who got a patent for it for himself. The application of the steam-engine of the governor (see STEAM-ENGINE) was Watt's crowning improvement. He made numerous inventions unconnected with the steam-engine.

He retired 1800, giving up to his two sons his interest in the extensive and prosperous business which Boulton had created at Soho. He died at Heathfield Hall in Staffordshire, in his 84th year. Watt had extensive and accurate knowledge of the physical sciences—to several of which he made important contributions—and an almost unsurpassed fund of general information. (For his claims to be considered the discoverer of the composition of water, see WATER.) He was elected a fellow of the Royal Society of Edinburgh 1784; a fellow of the Royal Society of London in 1785; and afterward a member of the Institute of France.—Watt was a man of much modesty and warmth of heart.

WATTEAU, *vâ-tō'*, ANTOINE: French painter: 1684-1721, July 18; b. Valenciennes. In 1702 he went as a poor boy to Paris, and worked as assistant to a painter of saints for rural customers. When this employment failed him, by the retirement of his master from Paris, he took a place in the studio of Gillot, a popular painter of the day. From Gillot he passed to Audran, then decorating the Luxembourg; but left him through some disagreement—producing about this time his first two pictures, *Departing Regiment,* and *Regiment Halting.* In

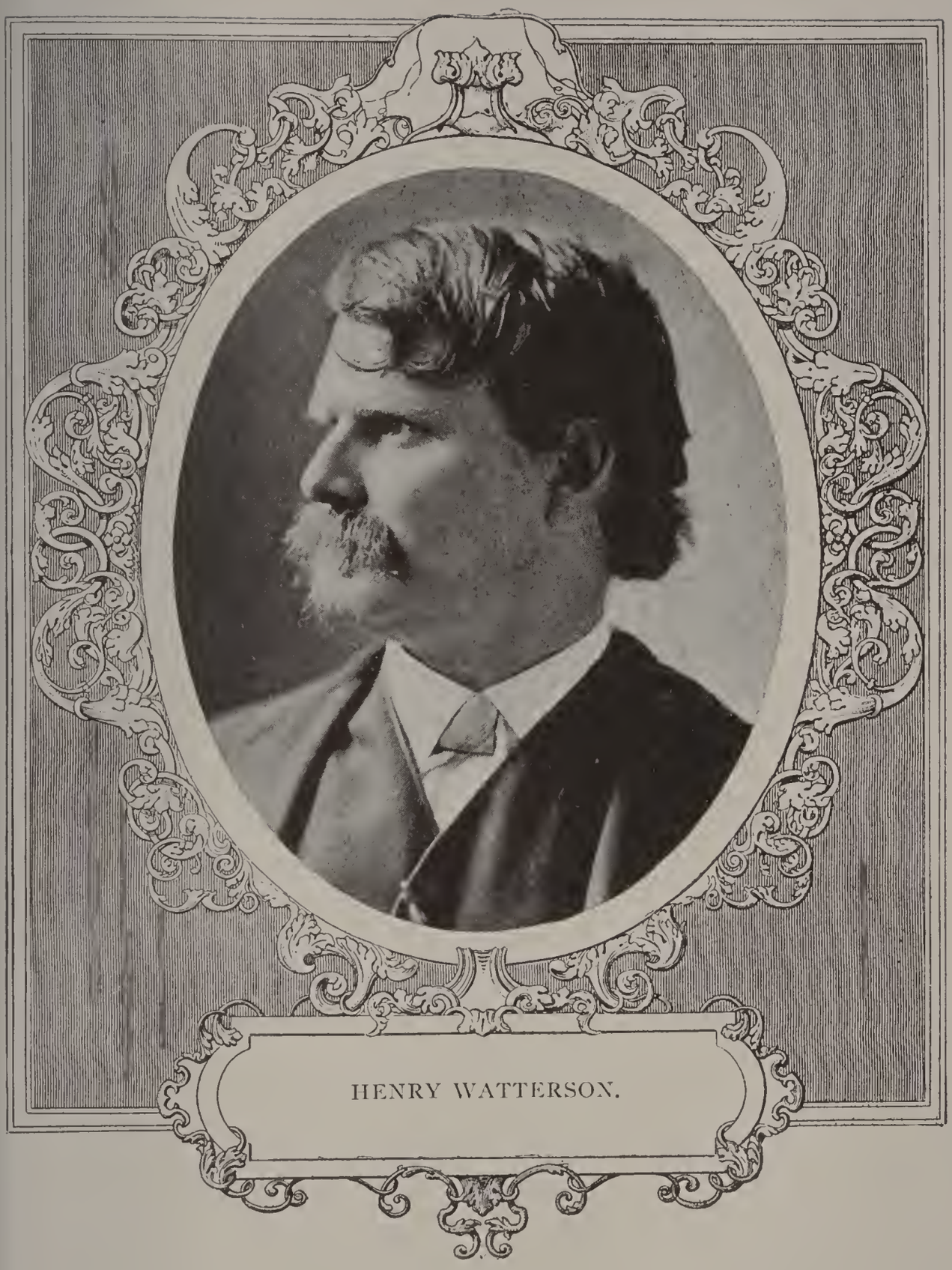
1709 he stood second in the competition for the great prize: his success was assured; he was made a member of the French Academy 1717, and became by special favor *Peintre des Fêtes Galantes du Roi.* In 1718 he visited England, remaining about a year.

In virtue of their charming color and graceful design, the pictures of Watteau continue to please, though his reputation as an artist is far less than in his lifetime. He employed himself chiefly in painting small landscapes with something of the nature of the *Fête Galante* going on in them—idyls in court-dress, which, as preserving for us the fopperies of the time, have a value besides that of their artistic brilliancy.

WATTERSON, *wŏt'ėr-son,* HENRY, D.C.L., LL.D.: journalist: b. Washington, D. C., 1840, Feb. 16; son of Harvey McGee Watterson, lawyer and journalist. He entered the journalistic profession in Washington 1858; became editor of a newspaper in Nashville, Tenn., 1861; was in the Confederate army as staff-officer and chief of scouts 1861-63. He then resuscitated his newspaper, *Republican Banner;* succeeded George D. Prentice as editor of the Louisville, Ky., *Journal,* 1867, and on consolidation of that paper with two others, *Courier* and *Times,* became editor of the *Courier-Journal.* He was representative in congress 1876, Aug. 12—1877, Mar. 3; was delegate from Kentucky in several national conventions of the democratic party, and presided over the convention at St. Louis 1876. As editor of the *Courier-Journal* Watterson has been a very influential leader in his party. His public speeches are infrequent. He has published *Oddities of Southern Life and Character* (1882); *History of the Spanish-American War* (1899); *and Abraham Lincoln* (1899).

WATTLE, n. *wŏt'tl* [AS. *watul, watel,* a hurdle or covering: Bav. *wadel,* fir-branches, twigs; the primary sense, according to Skeat, is something woven, hence a hurdle, a bag of woven stuff]: a twig or flexible rod, a hurdle made of flexible rods; the fleshy excrescence under the head of a cock or turkey; the like substance on a fish; a name applied in Australia to various species of Acacia (q.v.): V. to bind with twigs; to twist or interweave, as twigs with one another. WAT'TLING, imp. *-tlĭng.* WATTLED, pp. *wŏt'tld:* ADJ. having wattles, as a cock or turkey.

WATTLE-BIRD, *wŏt'tl-bėrd* (*Anthochœra carunculata*): Australian bird, of family *Meliphagidæ* or Honey eaters. It is about the size of a magpie, grayish brown above, each feather striped and bordered with white; the tail brown, long, wide, and graduated. It derives its name from a pendulous reddish wattle on each side of the throat. It feeds chiefly on honey and insects extracted from the flowers of *Banksias*—trees continuing in flower most of the year. It is a bold and active bird,



HENRY WATTERSON.

and drives away all other birds from the part of the tree which it occupies.

WATTS, *wŏtz,* FREDERICK: lawyer: 1801, May 9—1889, Aug. 17; b. Carlisle, Penn. He graduated at Dickinson College 1810, studied law, and was admitted to the bar 1824; 1831 appointed supreme-court reporter; 1845 elected president of the Cumberland Valley railroad; 1849 commissioned president-judge of the 9th judicial district of Pennsylvania; 1871 appointed commissioner of agriculture, serving in this position until 1877, when he resumed his law practice at Carlisle. As court reporter he edited the supreme-court reports 1832-40 and 1841-45.

WATTS, *wŏtz,* GEORGE FREDERICK: English painter: b. London 1817, Feb. 23; d. there 1904, July 1. He studied in the Royal Academy, and in 1837 exhibited there two portraits of young ladies and a subject-picture entitled *The Wounded Heron,* and afterwards contributed to various art exhibitions, notably the Royal Academy, the Grosvenor Gallery, and the New Gallery, about 300 pictures of various kinds. Some of these are landscapes and seascapes; a few, such as *The Sempstress* and *Under the Arch,* portray contemporary life; but the finest and most characteristic are portraits and allegorical or ideal subjects. His portraits include those of the most eminent men and women of his age, and perhaps form his chief claim to renown, as they were the basis of his reputation as an artist. Of his other pictures the following may be mentioned: *Isabella Finding Lorenzo Dead* (1840); *Paolo and Francesca* (1848); *Orlando Pursuing the Fata Morgana* (1848); *Life's Illusions* (1849); *Sir Galahad* (1862); *The Wife of Pygmalion* (1868); *The Return of the Dove to the Ark* (1869); *Daphne* (1870); *Fata Morgana* (1870); *The Curse of Cain* (1872); *The Prodigal* (1873); *Dedicated to All the Churches* (1875); *The Dove That Returned Not Again* (1877); *Love and Death* (1877); *Time and Death* (1878), like the preceding, one of his most notable pictures; *Orpheus and Eurydice* (1879); *Paolo and Francesca* (1879); *Psyche* (1880); *The Rider on the Pale Horse, The Rider on the Black Horse, The Rider on the White Horse,* and *The Rider on the Red Horse,* all apocalyptic pictures of 1883; *Love and Life* (1884); *Rain Passing Away* (1884); *The Angel of Death* (1888); *The Wife of Plutus* (1889); *She Shall Be Called Woman* (1892), a large picture of Eve; *For He Had Great Possessions* (1894); *The Outcast* (1895); *Jonah* (1895); *Eve Tempted* and *Eve Repentant* (1896); *Love Triumphant* (1898); *Court of Death* (1902). He was in Italy during 1843-7, and was powerfully influenced by Titian and Tintoretto. In 1847 his colossal oil-pictures of *Echo* and *Alfred Inciting the Saxons to Prevent the Landing of the Danes* were awarded a prize of £500 in another Westminster Hall competition. The lat-

ter of these now adorns a committee room of the houses of parliament. He completed a fresco, *St. George Overcomes the Dragon*, in 1853, for the houses of parliament, and at a later date painted in fresco the west end of the new hall at Lincoln's Inn. After 1896 he was on the list of retired academicians. A large number of his portraits, presented by him to the nation, are now in the National Portrait Gallery, and some of his best allegorical paintings were presented to the National Gallery of British Art (Tate Gallery). To use his own words. he painted ideas rather than objects, and the poetic idealism to which he was faithful throughout all his long career stood in the way of extensive popularity. His drawing was of the utmost correctness and his coloring often extremely fine, but while his allegorical subjects were often great in conception and treatment, they sometimes required too much literary exposition to appeal to the ordinary picture lover in a clear and direct manner.

WATTS, HENRY: English chemist: 1815, Jan. 20—1884, June 30; b. London. He graduated at University College, London, 1841. In 1848 he began the translation of Gmelin's *Handbook of Chemistry* (18 vols.), on which he was engaged for 20 years; but his best-known work is his *Dictionary of Chemistry* (5 vols.), completed 1868, to which he added several supplementary volumes. He died in London.

WATTS, ISAAC, D.D.: English Independent minister and hymn-writer: 1674, July 17—1748, Nov. 25; b. Southampton, where his father had a boarding-school. He is said to have begun the study of the classics in his 5th year, and to have composed devotional hymns at the age of 7 or 8. He was educated at the grammar school of his native place, and sent at the age of 16 to an academy in London, kept by the Rev. Thomas Rowe, an Independent minister. Here his devotion to his studies was so excessive as to permanently injure his constitution. In 1696 he became tutor in the family of Sir John Hartopp, at Stoke-Newington, with whom he remained six years. During the latter part of this time he officiated as assistant to Dr. Chauncey, minister of the Independent church in Mark Lane, to whose post he succeeded 1702. His health was throughout infirm; and in 1712 he was prostrated by an illness so violent that he never thoroughly recovered from its effects, though he lived many years afterward. A visit which he paid to Sir Thomas Abney, at Theobalds, for change of air, resulted in his domestication in the establishment till his death, 36 years afterward. As his health permitted, he continued to discharge his clerical duties, and to occupy himself with literary pursuits. Though Dr. Watts was of a fervent evangelical spirit—as his hymns show—his religious opinions were unusually liberal. His theological works were

numerous, but are now quite forgotten. His treatise on *Logic,* long since superseded, had in its day high reputation, and was adopted as a text-book by the University of Oxford. Dr. Watts was probably the chief of the founders of modern English hymnody. His style is often faulty; but in a large portion of his work he shows fine fervor, nervous strength, and graceful simplicity. Discarding the mass of inferior work, we find more of his hymns that are fitted for congregational use than in the compositions of any other writer. So lately as 1837 his *Horæ Lyricæ* were republished, with a Memoir by Southey: his other poetical works were: *Hymns and Spiritual Songs; Psalms of David in the Language of the New Testament; Divine and Moral Songs for Children.* See Johnson's *Lives of the Poets.*

WATTS, Thomas: English philologist and librarian: b. early in the 19th century; d. 1869, Apr. 9. At school he studied Latin, French, and Greek; distinguished himself by his attainments in English; read every book that came in his way; and wrote, apparently with ease, tales, essays, and poetry above the average of the magazine-writing of the day. Watts soon added an acquaintance with Italian, Spanish, and Portuguese; likewise with German, Dutch, Swedish, Danish, and Icelandic. Later he made some progress in Hebrew, Arabic, Persian, Turkish, and even Chinese; but did not master them as he did those languages before named, and as he subsequently mastered Russian, Polish, and Hungarian, which three languages Watts could read and translate with ease. He was well acquainted with the Welsh language and literature, and had some knowledge of Gaelic and Irish. In 1838 Watts was engaged as an assistant in the department of Printed Books in the British Museum (q.v.); 1857 was appointed superintendent of the splendid new reading-room; 1866, keeper of the department of Printed Books. Through nearly all these years the purchases for the library were largely at his suggestion; and the classification and arrangement of volumes was in part on an 'elastic system' devised by him. Watts was a member of the Philological Society of London. Among his literary productions are: 'Notes of a Reader,' contributed to a weekly periodical entitled *The Spirit of Literature* (1830); *A Sketch of the History of the Welsh Language and Literature* (reprinted from Knight's *English Cyclopædia* (1839); more than a hundred biographies of eminent men, Russian, Hungarian, Bohemian, etc., contributed to the same *Cyclopædia;* numerous articles in the *Biographical Dictionary* of the Society for Diffusion of Useful Knowledge; papers in the *Transactions of the Philologieal Society;* also contributions to the *Quarterly Review,* the *Athenæum,* and other periodicals.

WATTS-DUN'TON, Theodore: English poet, critic, and novelist: b. St. Ives, Huntingdonshire, 1836. He

was educated privately at Cambridge and for a time studied law, but had already gained a reputation as a writer of sonnets when he joined the staff of the *Examiner* as literary and art critic. On leaving the *Examiner* he joined the *Athenæum* staff, and for many years has been one of the chief contributors to that review, his criticisms of poetry being of the most illuminating character. In 1897 he published a poem entitled *Jubilee Greeting at Spithead to the Men of Greater Britain,* which met with wide appreciation; and in the same year collected in *The Coming of Love, and Other Poems* some of the more important of his poetical contributions to the *Athenæum* and other literary journals. *Aylwin,* a novel or romance published in 1898 (privately printed 1883), forms a striking prose counterpart to *The Coming of Love,* and contains excellent pictures of gypsy life. Watts-Dunton has also contributed largely to the *Nineteenth Century* and other periodicals. Several of the notices in Ward's *English Poets* are from his pen, and the valuable critical article on poetry in the *Encyclopædia Britannica* was written by him. Later publications are: *The Christmas Dream* (1901), and *The Renaissance of Wonder* (1902). On occasion Watts-Dunton makes free use of the Romany dialect, which he has carefully studied. His best work is probably the critical, especially that dealing with the principles of verse.

WAT TYLER INSURRECTION: insurrection in England, excited by a poll-tax of three groats, imposed 1381, during Richard II.'s minority, to defray the expenses of the war with France. An insult offered by one of the tax-gatherers to a blacksmith's daughter in Essex led to the first outbreak. The populace rose in many places; and under the conduct of two peasants, Wat Tyler and Jack Straw, they mustered in great force at Blackheath, committing violence on all who came into their hands. They had an interview with the king, who, finding resistance vain, promised acquiescence with their demands, which included a general pardon, freedom of commerce, and abolition of villeinage. Meantime a party of insurgents had broken into the Tower, and murdered the primate and chancellor and the treasurer. The king, encountering Tyler at the head of the rioters in Smithfield, invited him to a conference, when he conducted himself with an insolence that led Walworth, the mayor, to dispatch him with a dagger. The king immediately, with great presence of mind, offered himself to head the populace; and leading them to the fields at Islington, where a body of troops had been collected for his majesty's' protection, ordered the rioters to disperse. The revolt, however, was not extinguished without considerable bloodshed.

WAUGH, Arthur: English author: b. Midsomer Norton, Somerset, 1866, Aug. 24. He was graduated from Oxford in 1889, became a journalist in London in 1890,

was London correspondent of the New York *Critic* in 1893-7, and in 1894 was sub-editor of the London *New Review*. He acted as literary adviser to Kegan Paul & Co. in 1895-1902, and is now managing director of the London publishing firm of Chapman & Hall. He has written: *Gordon in Africa* (1888); *Alfred, Lord Tennyson, a Study* (1892); *Legends of the Wheel* (1898); etc.; and has edited: *Johnson's Lives of the Poets* (6 vols., 1896); Biographical edition of Dickens (19 vols., 1902-3); and other works.

WAUKEGAN, *waw-kē'gan:* city, capital of Lake co., Ill.; on Lake Michigan, and on the Chicago and Northwestern and the Elgin, Joliet and Eastern railroads; 35 m. n. by w. of Chicago, 50 m. s. of Milwaukee. It is on a bluff 80 ft. above the lake, with an intervening beach, and is noted for its salubrity, many mineral springs, and manufactures, besides being a favorite place of summer residence for many Chicago families. There are numerous churches, public park, St. Alberta's Academy, commercial college, artesian water-works, banks, and several newspapers. The industries include manufactures of agricultural implements, pumps, scales, wagons and carriages, machinery, foundry products, leather, woolen goods, and beer. Pop. (1910) 16,069.

WAUKESHA, *waw'kē-shaw:* town, capital of Waukesha co., Wis.; on the Fox river, and on the Chicago, Milwaukee and St. Paul, the Chicago and Northwestern, and the Wisconsin Central railroads; 20 m. w. of Milwaukee. It is in the richest agricultural section of the state, and from its location on the river, and the presence of 10 mineral springs of high medicinal repute, has become known as the 'Saratoga of the West.' It is beautifully laid out and ornamented, and contains 9 churches, the state industrial school for boys, Carroll College, stone court-house, lime and stone quarries, banks, weekly newspapers, railroad car-shops, and several manufactories. Pop. (1900) 7,419; (1910) 8,740.

WAUKON, Iowa: town, county-seat of Allamakee co.; on the Chicago, Milwaukee and St. Paul railroad; about 80 m. n. by w., in direct line, from Dubuque. It is in an agricultural, fruit growing, and stock-raising region. It has flour mills, creameries, wagon factories, canning factory, machine shop, grain elevator, and stock-yards. There are 7 churches, a high school, public and parish elementary schools, a business college, and a public library. There are 3 banks. Pop. 2,000.

WAUL, v. *wawl* [a word imitative of the cry]: to cry as a cat: N. the cry of a cat.

WAUPACA, Wis.: city, county-seat of Waupaca co.; on the Waupaca river, and on the Wisconsin Central railroad; about 133 m. n.w. of Milwaukee and 38 m. n.w. of Oshkosh. It is in an agricultural and stock-rais-

ing region. It has excellent water-power, and many attractions which make it a favorite summer resort. The climate is cool in summer and in the vicinity are a number of small picturesque lakes. The chief manufacturing establishments are flour mills, lumber and woolen mills, machine shops, and potato starch factories. It has the State Soldiers' Home, public graded schools and four churches. The two banks have a combined capital of $100,000. Pop. 2,010.

WAUPUN, Wis.: city in Fond du Lac and Dodge cos.; on the Chicago, Milwaukee and St. Paul railroad; about 70 m. n.w. of Milwaukee and 17 m. s.w. of Fond du Lac. It is in an agricultural region. The chief manufacturing establishments are pump and wind-mill factories, cane goods works, umbrella factory, flour and lumber mills, and creameries. In 1900 (government census) there were 42 manufactories, capitalized for $493,590. The cost of the raw material used annually was $793,504, and the value of products was $1,200,844. The principal buildings are the state prison, the city-hall, the churches and schools. The national bank has a capital of $50,000. There are 9 churches, a high school, graded schools, and a school library. Pop. 3,000.

WAUR, a. *wawr:* in *Scot.,* worse.

WAUSAU, *waw'saw:* city, capital of Marathon co., Wis.; on the Wisconsin river, and on the Chicago, Milwaukee and St. Paul and the Chicago, Milwaukee and Lake Shore railroads; 80 m. n.w. of Milwaukee. It is in an agricultural and lumbering region; has excellent water-power; contains 19 churches, graded schools, banks, and weekly and monthly periodicals; and carries on a large business in manufacturing, lumbering and granite quarrying. Pop. (1900) 12,354; (1910) 16,560.

WAVE, n. *wāv* [OE. *wawe;* AS. *wæg;* Ger. *woge;* Dan. *vove;* Icel. *vágr,* a billow, a wave: Ger. *weben,* to wave, float, hover: OHG. *wegan,* to move, to vibrate: Icel. *vafra, vafla,* to waver]: a surface disturbance consisting of the alternate rising and falling of water or the like, above and below its natural level; a moving swell or volume of water; a billow; any motion or appearance resembling that of a wave; any physical vibration, as *waves* of sound, etc. (see below); a waving gesture or motion, as of the hand, a sword, or the like; with definite article, *the wave* or *the waves,* the sea; the ocean: V. to move to and fro or up and down; to undulate; to give a wavy form to; to decorate with waves or wavy lines; to direct by a waving motion; to beckon; in *OE.,* to waver. WA'VING, imp. a moving to and fro: N. the act of moving as a wave; the act of moving to and fro. WAVED, pp. *wāvd:* ADJ. variegated in lustre. WAVE-LIKE, resembling a wave. WAVE'LESS, a. *-lĕs,* without waves; undisturbed. WAVY, a. *wā'vĭ,* that plays to and fro, as

waves; full of waves; undulating in movement or form. WA'VINESS, n. the state or quality of being wavy or undulating. WAVE'LET, n. *-lĕt*, a small wave; a ripple on water. WAVE-OFFERING, in the *Jewish worship*, an offering made by the priest holding aloft and *waving* the thing offered toward heaven as a symbol of its presentation to Jehovah. WAVESON, n. *wāv'sŭn*, goods which appear floating on the sea, as after a shipwreck. WAVE-WORN, a. worn by the waves.

WAVE, v. *wāv:* a form of WAIVE (q.v.).

WAVE: *state of disturbance*, consisting of alternate elevations and depressions propagated from one set of particles of a medium to the adjoining set, and so on; sometimes with, sometimes without, a small permanent displacement of these particles. But the essential characteristic is, that energy (see FORCE), not Matter (q.v.), is on the whole transferred. The theory of wave-motion is of the utmost importance in physical science; since, besides the tide-wave, waves in the sea, in ponds, or in canals, undulations in a stretched cord (such as a pianoforte wire), or in a solid (as sound-waves or earthquake-waves), we know that sounds in air are propagated as waves (see SOUND), and that even light (see UNDULATORY THEORY) is a form of wave-motion.

The general investigation of the form and rate of propagation of waves demands the application of the highest resources of mathematics; and the theory of even such comparatively simple cases as the wind-waves in deep water (the Atlantic roll, for instance), though easily enough treated to a first and even to a second and third approximation, has not yet been thoroughly worked out, as fluid friction has not been taken account of. In this article, therefore, we merely *state* some of the more important conclusions which mathematical analysis has established in the more difficult of these inquiries, comparing them with the observations of Scott Russell and others; while we give at full length the very simple investigations the motion of a wave along a stretched cord, and of the propagation of a particular kind of sound-wave.

To find the rate at which an undulation runs along a stretched cord—e.g., when a harp-string is sharply struck or plucked near one end—a very simple investigation suffices. Suppose a uniform cord to be stretched with a given tension in a smooth tube of any form whatever, we may easily show that there is a certain velocity with which the cord must be drawn through the tube in order to *cease to press on it at any point*—that is, to move independently of the tube altogether; for the pressure on the tube is due to the tension of the cord, and is relieved by the so-called Centrifugal Force (see CENTRAL FORCES) when the cord is in motion.

If T be the tension of the cord, r the radius of curva-

ture of the tube at any point, the pressure on the tube per unit of length is

$$\frac{T}{r}.$$

If m be the mass of unit length of the cord, v its velocity, the centrifugal force is

$$\frac{mv^2}{r}.$$

These are equal in magnitude, and so destroy each other, if

$$T = mv^2.$$

Hence, if the cord be pulled through the tube with the velocity thus determined, there will be no pressure on the tube, and *it may therefore be dispensed with.* If we suppose the tube to have a form such as that in the figure, where the extreme portions are in one straight line, the

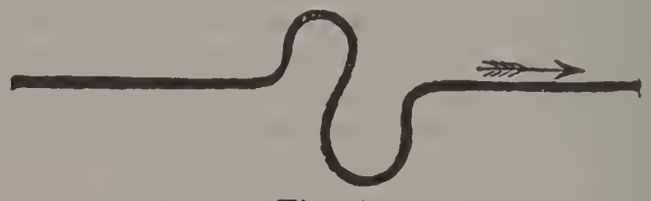


Fig. 1.

cord will appear to be drawn, with velocity v, along this, the curved part being occupied by each portion of the cord in succession—presenting something like the appearance of a row of sheep, in Indian file, jumping over a hedge.

To a spectator moving in the direction of the arrow with velocity v, the straight parts of the cord will appear to be at rest, while an undulation of *any* definite form and size whatever runs along it with velocity v, in the opposite direction. This is a very singular case, and illustrates in a very clear manner the possibility of the propagation of a *solitary* wave.

Thus we have proved that the velocity with which an undulation runs along such a cord is

$$\sqrt{\frac{T}{m}}$$

If l be the length of the cord in feet, w its whole weight, W the appended weight by which it is stretched, $g = 32.2$ ft., the measure of the earth's gravity, this becomes

$$\sqrt{\frac{W}{w}lg}.$$

This formula is found to agree almost exactly with the results of experiment. We can easily see why it should

be to a small extent incorrect, because we have supposed the cord inextensible and perfectly flexible, which it cannot be; and we have neglected the effects of extraneous forces, e.g., gravity, resistance of the air, etc.

Consider next the motion of air in a cylindrical tube, in the particular case in which the leg of a vibrating tuning-fork is applied at one end. This is a simple case of the propagation of sound-waves: we treat it by a synthetical process, somewhat like that given by Newton.

It has been shown (see PENDULUM) that a simple vibration such as that of a pendulum or tuning-fork is the resolved part, in a definite line, of the uniform motion of a point in the circumference of a circle. What we have now to show is, that such a motion of all the particles of air in the pipe, the *phase* of the vibration (or the position of the particle in its path at any instant) depending on its distance from the end of the tube, is consistent with mechanical principles. When this is done, it will be easy for us to trace, in this particular example, the process by which the wave is propagated from one layer of the fluid to the next. We must now consider (a little more closely than in PENDULUM or SOUND) the nature of the simple vibration of each particle of the air.

Suppose P to move, with uniform velocity V, in the circle APB, and let PQ be drawn perpendicular to the fixed diameter OA. Then the acceleration of P's motion is $\frac{V^2}{OA}$ in the direction PO. Hence in the motion of Q, which is a simple vibration, we have, by the rule for resolving velocities and accelerations (see VELOCITY),

$$\text{Velocity of Q} = \frac{PQ}{AO} V \text{ in the direction QO;}$$

$$\text{Acceleration of Q} = \frac{OQ}{OA} \frac{V^2}{OA} \text{ in the direction QO.}$$

Next consider two particles of air near one another in the axis of the tube, or the masses of air in two contiguous cross-sections of the tube. If the phase of vibration were the same for both, they would be *equally* displaced from their original positions, and the air between them would be neither compressed nor dilated. Hence, that a wave may pass, the phases must be different. Let, then Q represent the position of the one particle, or layer, in its line of vibration at any instant; Q′, the simultaneous position of the other. The first will be displaced through a space OQ from its position of rest; the second, through a space OQ; and their distance will therefore be altered by the amount QQ′, which may be taken to represent the compression or dilatation. But it is easy to see that, as P and P′ move round, QQ′ is always proportional to PQ. Hence the compression or dilatation of the air in

any cross-section of the tube is proportional to the velocity with which it is moving. Hence the difference of pressures before and behind any such section is proportional to the difference of velocities—i.e., to the acceleration of the motion while the section passes over a space equal to its own thickness. And this is consistent with mechanical principles, for the *mass* of air in the section is constant, while the difference of pressures before and behind produces the acceleration, and should therefore be proportional to it. The particles of air in cross-sections of the tube therefore vibrate, each in the same period as does the tuning-fork, but the phase is *later* for each section in proportion to its distance from the fork. Where the phase is one or more whole vibrations later than that of the fork, the motion is exactly the same as that of the fork, and *simultaneous* with it. At all other points it is the same as that of the fork, but not simultaneous. Thus the greatest displacement of the fork is immediately shared by the layer next it, later by the next layer, and so on. Thus a *wave* of displacement travels along the tube from one section to the next, while each particle merely oscillates forward and backward through (in general) a very small space about its position of rest.

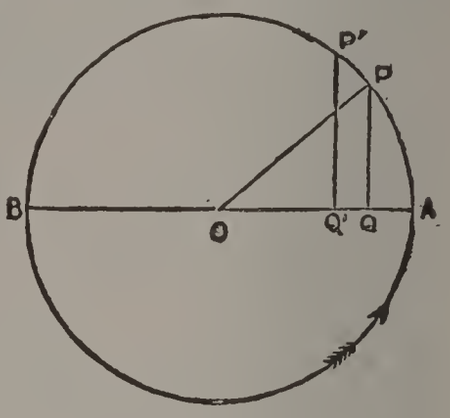


Fig. 2.

The reader who has followed the little geometrical investigation above will have no difficulty in proving for himself that the velocity with which the wave travels is proportional to

$$\sqrt{\frac{p}{\rho}}$$

where p is the pressure, and ρ the density of the air. The easiest mode of doing this is to express, in terms of these and other quantities, the equation given us by the laws of motion,

Mass × Acceleration = Difference of pressures,

and to assume that Hooke's (q.v.) Law holds, even during the *sudden* compression of air. This, we know, is not the case; so that a correction has to be applied to the above expression, depending on the heat developed by sudden compression or lost in sudden rarefaction, by each of which the elastic force of the air is *increased*. See SOUND.

The above formula shows us, however, that the velocity of sound is not affected by the pressure of the air—i.e., the height of the barometer—since, in still air, p is *proportional* to ρ. The velocity does depend on the tem-

perature, being, in fact, proportional (*cæteris paribus*) to the square root of the temperature measured from absolute zero. See HEAT.

We see also from the formula that the velocity is inversely as the square root of the density of the gas—the pressure being the same. Thus, a sound-wave travels about four times faster in hydrogen than in air.

We see also that, within the limits of approximation that we have used, the velocity does not depend on the intensity, pitch, or quality of the Sound (q.v.). The investigations which seem to lead to slight modifications of this conclusion are too recondite to be introduced here. We can only mention, also, the beautiful investigations of Stokes (q.v.) connected with the extinction of a sound-wave as it proceeds, partly by fluid friction, partly by radiation. And we may conclude by stating that the result of a completely general investigation of the velocity of a sound-wave gives, to a first approximation, the result we have deduced from the study of a simple particular case.

We come now to consider waves in water. Of these, there are several species. One, however, we may merely mention, as its theory is the same as that just now briefly discussed: this is a sound-wave, or *wave of compression*, in water. Its velocity is considerably greater than that of sound in air (see SOUND). The others, which are commonly observed on the surface of water, depend on mere changes of level, and their effects; and in studying them we may consider water as incompressible.

The first of these is what is called a *long* or *solitary* wave. Its essential characteristic is, that its length is great compared with the depth of the liquid in which it moves. To this class belong the tide-wave (see TIDES), and the long wave which accompanies a canal-boat, and which we see slowly traversing the canal when the boat is stopped. Scott Russell has made many interesting observations on this wave, all of which accord well with the results of the mathematical theory of its propagation. The velocity of this wave depends solely on the depth, not on the density of the liquid in which it moves—and in a uniform canal the velocity is that which would be acquired by a stone falling freely through a space equal to half the depth of the water. Another characteristic of this wave is that, after it has passed, it leaves the water bodily transferred through a small space along the bed of the canal—forward or backward, according as it consists of an elevation or a depression of the water-surface. Scott Russell has shown that the most favorable rate at which a canal-boat can be drawn is when its velocity is such that it rides on the crest of the solitary wave. If drawn at any other speed, it leaves the solitary wave behind, or is left by it; and in either case, part of the horse's work is expended in producing fresh solitary waves. An excellent mode of observing these waves is

to tilt slightly a rectangular box containing some water, and restore it to its original position. A long wave is thus formed, which is reflected repeatedly at the ends of the box, and whose rate of motion may be accurately observed by watching the image of a candle reflected at the surface of the water. If the sides of the box be made of glass, and some light particles be dispersed through the water, their motions enable us to discover all the circumstances of the propagation of this wave.

We come next to what are called *oscillatory* waves in water or other liquids. To this class belong all waves whose length from crest to crest is small compared with the depth of the liquid; from ripples on a pool to the long roll of the Atlantic. They are never observed as solitary waves, their general characteristic being their periodical recurrence. And, by watching a piece of cork floating on the surface, we see that it moves forward when at the crest of the wave, and backward through an equal amount when in the trough. Also it rises while passing from trough to crest, and sinks from crest to trough. Mathematical investigation, confirmed by experiments with floats at sea, and with short waves in the glazed box above described, shows that each particle of the water describes a *circle* about its position of rest in the vertical plane in which the wave is advancing. Particles at greater and greater depths describe smaller and smaller circles. The diameters of these circles diminish with extreme rapidity. At a depth equal to the distance from crest to crest (i.e., the length of the wave), the displacement of the water is already only $\frac{1}{535}$ of that at the surface. At the depth of two wave-lengths it is about $\frac{1}{300000}$ of that at the surface. Thus we may see to how small a depth the ocean is agitated even by the most tremendous wind-waves; for, according to Scoresby, 43 ft. is about the utmost difference of level between crest and trough in ocean-waves. If the wave-length be 300 ft. (a large estimate), then at the depth of 300 ft. the water-particles describe circles whose radii are only the $\frac{21}{535}$ of a foot, or about four-tenths of an inch; and at 600 ft. this is reduced to $\frac{1}{1200}$ of an inch; while the depth of the Atlantic is in many parts more than three or four miles. In this case, the velocity of propagation of the wave has been shown to be

$$\sqrt{\frac{gl}{2\pi}}$$

where g is, as before, 32.2 ft.; l is the wave-length in feet; and π is the ratio of the circumference of a circle to its diameter (see QUADRATURE OF THE CIRCLE). Thus the velocity of an oscillatory wave in deep water is proportional to the square root of its length. This fact has been of use as an analogy in helping us to account for the *Dispersion* (see REFRACTION) of Light, where, by ex-

periment, we know that the waves of red light are longer than those of blue light, also that they travel faster in refracting media.

When the depth is not infinitely great compared with the length of a wave, theory and experiment agree in showing that the motion of each particle takes place in an ellipse whose major axis is horizontal. These ellipses diminish rapidly in length as we descend in the liquid, but still more rapidly in breadth; so that, as was to be expected, the particles *at* the bottom oscillate in horizontal straight lines. The expression for the velocity of propagation is now far less simple than in the previous cases, but is easily shown to include the values above given.

So far, the first approximation. A section of the surface made by a vertical plane in the direction of the wave's motion is shown to be bounded by the *Harmonic* Curve, or Curve of *Sines*, the form assumed by a vibrating string (see SOUND); from which it follows that the crests are similar to the troughs. The second approximation makes the troughs flatter, and the crests steeper, and also shows that the particles are, on the whole, carried forward by each successive wave. The amount of this progression diminishes rapidly with the depth below the surface. A third approximation shows that the velocity is, *cæteris paribus*, greater the greater is the height of the waves.

When waves advance toward the shore, their circumstances change, in general gradually, from those of oscillatory waves to those of waves of translation, as the depth of the water becomes less and less considerable in comparison with the length of the wave; and it is found by experiment that they 'break,' as it is called, when the depth of the water is about equal to the height of the crest above the undisturbed level. All the curious phenomena of breakers are thus easily explained by the results above given, when they are considered with reference to the gradual alteration of the depth of the water.

Finally, we must notice a singular phenomenon often observed—viz., that, of a series of waves breaking on the coast, every eighth, or ninth, or tenth, etc., is seen to be higher than its predecessors or successors. The explanation is simple, and points to the simultaneous existence of two or more sets of oscillatory waves of different lengths, due in general to quite distinct causes, which reach the shore together.

The above might lead us to consider the very interesting case of '*Co-existence of Small Motions*' presented by the Interference (q.v.) of such waves; but sufficient examples of the great principle involved are given in various articles. (See POLARIZATION; SOUND; UNDULATORY THEORY.)

There remains the consideration of the propagation of waves in elastic solids, among which, at least so far as

luminiferous vibrations are concerned, it appears that the Ether (q.v.) must be ranked. This is a subject of a higher order of difficulty than any of those above mentioned, and, in the case of light at least, has not yet been treated in a thoroughly satisfactory manner, though profound memoirs have been written on it.

WAVELLITE, n. *wā'vĕl-līt* [after Wavel, English physician, its discoverer]: an attractive, radiated mineral, essentially a hydrous basic phosphate of aluminum, $4AlPO_4.2Al(OH)_3 + 9H_2O$. It rarely occurs in distinct orthorhombic crystals; usually it is in more or less complete spherical aggregates, externally showing crystal terminations and with radiated structure. Its hardness is 3.25 to 4, and its specific gravity about 2.32. In the many European localities its color is usually white or pale green; at its most important American locality in Arkansas it is light to dark green, while the curious stalactitic wavellite of White Horse, Pennsylvania, is white.

WAVE MOTOR: a mechanism for obtaining power from the force of ocean waves. The method as adopted in various experiments is as follows: At a point unprotected by outlying rocks or shoals, two wells 8 and 5 ft. in diameter, respectively, are sunk in the cliff, one behind the other, the foremost but 5 ft. from the brink. These wells extend from 30 ft. above high tide to below the ebb and open at bottom in the ocean. A counterbalanced float rises and falls between vertical guides in the foremost well as the swells outside raise or lower the water level. The plunger of a common force pump working in any part of a long pump barrel occupies the second well, forcing on the down stroke the salt water vertically 125 ft. to a 5,000-gallon tank raised on a 60-foot derrick on the bank above. A 35-foot, four-post derrick carries the vertical guides for pump and float, which are fastened at and near the outer end of a 12-in. round timber 60 ft. in length, the butt counterbalanced on the bank over two small iron car-wheels rolling on a short track, and thus allowing the timber to recede and advance as well as to osculate as its outer end follows the vertical guides. The stopping and starting contrivance is the climax of simplicity. A strong chain leads from the outer end of the beam above the float over two shelves at the top of the derrick, and suspends a large barrel in vertical guides at the side. To stop the motor the barrel is filled with water from a short garden hose attached to a convenient connection from the tank. The weight of the filling barrel gradually overbalances the float, raising it above the waves. When the motor is to start, a plug is pulled from the bottom of the barrel and the float gradually goes into action.

WAVE OFFERING: in Hebrew, *tenuphah*, from

nuph, to wave, a sacrificial ceremony mentioned in the Old Testament, in Leviticus xiv. 24, in the rites to be followed in cleansing a leper, and in Numbers vi. 20, in the description of ceremonies attending the separation of a Nazarite, and in other places. The offering is believed by the rabbis to have been waved to the four points of the compass, as an acknowledgment of God's sovereignty over the earth, while the heave offering, mentioned in connection with the wave offering, is supposed to have been lifted upward as a tribute to God's rule in heaven.

WAVER, v. *wā'vėr* [Scot. *waif*, to move backward and forward: Icel. *vafra*, to hover about: O.Ger. *waberen*, *wabelen*, to fluctuate: Norw. *vavra*, to flap about—from WAVE (which see)]: to play or move to and fro; to be unsettled in opinion; to hesitate; to be undetermined; to totter; to falter under fire, said of troops. WA'VERING, imp. WA'VERED, pp. *-vėrd*. WA'VERER, n. *-ėr*, one who wavers or vacillates; one unsettled in faith, doctrine, or opinion. WA'VERINGLY, ad. *-lĭ*. WA'VERINGNESS, n. *-nĕs*, vacillation.—SYN. of 'waver': to fluctuate; reel; vacillate.

WAVERLEY NOVELS: a series of anonymous historical romances taking name from the first, entitled *Waverley: or 'Tis Sixty Years Since*, published 1814, July. The series closed with *Tales of My Landlord*, fourth series, 1831. The authorship of the series was acknowledged by Sir Walter Scott at a dinner 1827, Feb. 23.

WAVERLY: city, county-seat of Bremer co., Iowa; on the Cedar river, and on the Chicago, R. I. and P., the Illinois C., and the Chicago G. W. railroads; about 27 m. s.e. of Charles City and 12 m. n. of Cedar Falls. It is in an agricultural and stock-raising region. It has a large number of butter and cheese factories, condensed milk factories, canneries, a furniture factory, a creamery-supply factory, a flour mill, and agricultural implement works. The four banks have a combined capital of $100,000. It has six churches. The educational institutions are Wartburg Teachers' Seminary and Academy, graded public schools, and a public library. The city owns and operates the waterworks. Pop. 1,600.

WAVERLY: village Tioga co., N. Y.; on the Chemung river, and on the Erie and the Lackawanna railroads; about 17 m. s.e. of Elmira and 20 m. s.w. of Owego. It is in a region largely devoted to farming and stock-raising. It is a shipping point for large quantities of butter, cheese, milk, eggs, poultry, and farm products. Waverly is near the coal and oil fields of Pennsylvania, and has connection by electric cars with Athens and Sayre, Pa. The two banks have a combined capital of $100,000. It has six churches, a high school established in 1871, grammar and primary schools, an opera house, and a town hall. Pop. (1900) 4,465; (1910) 4,855.

WAX, n. *wăks* [AS. *weax;* Icel. *vax;* Ger. *wachs;* Dan. *vox;* Dut. *was;* Russ. *voska,* wax]: properly the thick, sticky substance secreted by bees, and employed by them in the construction of their cells—also BEES-WAX, *bēz-;* a similar substance secreted by some insect of the Coccus family, or obtained from the leaves and fruit of certain plants (see below); any substance resembling wax; the brown substance found in the ear—usually *ear-wax;* substance used to seal letters—usually *Sealing-wax* (q.v.); resinous substance used by shoemakers—usually *shoemakers'* or *cobblers' wax;* in *slang,* a state of passionate excitement or anger, as to be in a *wax;* puddled clay used by miners for dams, or the like: V. to rub, smear, or unite with wax. WAX'ING, imp. rubbing thread with wax to strengthen it. WAXED, pp. *wăkst.* WAXEN, a. *wăks'n,* made of wax; covered with wax; soft like wax. WAX'Y, a. *-ĭ,* resembling wax; adhesive; not floury, as a potato: in *slang,* angry. WAX-CANDLE, a candle made of wax. WAX-CLOTH, cloth covered with a coating of wax, and ornamented with some figured pattern, used as covers for tables, pianos, etc.; a name also applied to floor-cloth. WAX-END, or WAXED END, thread covered with shoemakers' wax, and pointed, with a bristle. WAX-LIGHT, a wax-taper. WAX-MODELLING, the art of making figures, flowers, fruit, etc., in wax. WAX-WORK, figures of men, animals, flowers, fruits, etc., formed in wax; anatomical preparations in wax; an exhibition of wax figures; a plant, the climbing bitter-sweet, *Celastrus scandens.* WAX'Y INFILTRATION, in *pathol.,* the infiltration of waxy matter into any organ of the body. The most highly-developed and dangerous form of it is waxy degeneration of the liver. GRAVE-WAX, a name for ADIPOCERE (q.v.).

WAX, v. *wăks* [AS. *weaxan;* Goth. *vahsjan;* Icel. *vaxa;* Dut. *wassen;* Dan. *vœxe;* Sw. *växa;* Ger. *wachsen;* Skr. *vaksh,* to grow, to increase]: to increase; to become larger; to pass from one state to another; grow; become, as to *wax* fat. WAX'ING, imp. WAXED, pp. *wăkst,* also in *OE.* and *poetry,* WAXEN, pp. *wăks'n,* grown; increased.

WAX: a solid fatty substance derived from both the animal and the vegetable kingdoms. Matters comprised under this term are in general allied to the Fats; but they differ materially from them in chemical composition, some kinds being found to consist partly of mixtures of alcohols and compound ethers, and partly of free fatty acids. The general properties of the various substances called *wax* may be thus laid down: They are solid or semi-solid matters; are easily broken when cold, but at a moderate warmth are soft and pliable, and fuse at a temperature below 212°. They have a peculiar glistening appearance, are lighter than water, are insoluble in that fluid and in cold alcohol, but dissolve readily in ether; they are combustible and burn with an illum-

inating flame, are non-volatile, and when heated in a free atmosphere undergo decomposition. In this category are included Spermaceti (q.v.), bees-wax, Chinese wax, and other less-known kinds, as palm or vegetable wax (obtained from the bark of *Ceroxylon andicola*, by the action of hot water and pressure), Carnahuba wax (exudation from the leaves of a Brazilian palm. See CARNAHUBA PALM), sugar-cane wax, etc.

Bees-wax is an animal secretion formed by bees from sugar, and constitutes the material of which the cells of the honeycomb are composed. It is obtained by expressing the honey and fusing the residue in boiling water. In this state it is of a yellow color (*Cera flava*). It may be bleached, so as to form white wax (*Cera alba*), by being exposed in thin slices to the action of solar light, or by the action of nitric acid. (Chlorine readily destroys the color, but renders the wax unfit for candle-making, as a portion of the hydrogen of the wax is replaced by chlorine, and the candles, when burning, evolve irritating vapors of hydrochloric acid gas.) Wax consists of three different substances, *myricin*, *cerotic acid*, and *cerolein*, which are separable from one another by means of alcohol. *Myricin*, insoluble in boiling alcohol, constitutes 20-30 per cent. of the bulk of ordinary wax. *Cerotic acid*, which dissolves in boiling alcohol, but separates on cooling, varies in quantity in different specimens. In one sample of genuine bees-wax, Brodie found that it constituted 22 per cent., and it was always present in European samples, while in Ceylon wax it was entirely lacking. This curious variation in the nature of an animal secretion, under different conditions of life, resembles the variations sometimes noticed in the acids of butter, in which the butyric and caproic acids of one season are replaced in another by vaccinic acid, differing from the former acids in the amount of oxygen alone. *Cerolein*, the substance soluble in cold alcohol, is a greasy body, constituting 4 or 5 per cent. of ordinary wax. Bees-wax yields the following derivatives: cerotic acid or cerin, $C_{27}H_{54}O_2$; cerylic alcohol or cerotin, $C_{27}H_{56}O$; myricylic or melissic alcohol, $C_{30}H_{62}O$; melissic acid, $C_{30}H_{60}O_2$; palmitic acid, $C_{16}H_{32}O_2$; myricin, $C_{16}H_{31}O_2$; and melene, $C_{30}H_{60}$.

Chinese Wax ($C_{27}H_{55}.C_{27}H_{53}O_2$) is the product of a species of insect of the Coccus family (*Coccus pela*), and consists principally of ceryl cerotate.

Both yellow and white bees-wax occurs in the Pharmacopœia. The characters and tests, as given in that work, are—*Of yellow wax:* 'Firm, breaking with a granular fracture, yellow, having an agreeable honey-like odor; not unctuous to the touch, does not melt under 140°, yields nothing to cold rectified spirit, but is entirely soluble in oil of turpentine; boiling water in which it has been agitated, when cooled, is not rendered blue by iodine.' *Of white wax:* 'Hard, nearly white, translucent;

not unctuous to the touch, does not melt under 150°.' The iodine test is used because wax is often adulterated with starch. Wax was formerly much employed internally as an emollient medicine, in cases of suspected ulceration of the intestines. At present it is used only as an external agent, being an ingredient of many ointments and plasters.

The commercial value of bees-wax is very great; and if it were possible to ascertain the total of the quantity produced, it would cause surprise at the amount of valuable material derived from a source apparently so insufficient. Its chief uses are for candles, modelling, medicinal cerates or ointments; besides many minor purposes. In the ceremonies of the Greek and Roman churches, a great quantity of bees-wax is consumed in candles. Chinese wax, or *pe-la,* has been used in the manufacture of candles; but it is far too costly for general use (see WAX-INSECT). In China this wax is very highly valued, and is so costly as to be used only by the highest classes; it is white, and breaks with crystalline fracture and pearly lustre. Of Vegetable Wax, four distinct kinds are known in commerce. The first in importance is the JAPAN WAX, almost as white and compact as refined bees-wax, which it closely resembles: it is said to be obtained by boiling the seeds of a species of RHUS (*R. succedanea*). It has been used only in making candles. BRAZILIAN VEGETABLE WAX is an article of regular importation, but only in small quantities; it is obtained from the leaves of *Corypha cerifera*, the Carnahuba Palm of the Brazilians. It forms a glossy varnish-like covering; and when the leaves are gathered, and begin to shrink from withering, it cracks and peels off, and is collected and melted into masses. It is hard and brittle, and of dull yellow color. The candle-makers have used it for mixing and improving other materials. In Brazil, candles are wholly made of it, or half the quantity of stearin is added. The VEGETABLE WAX of the Andes is yielded also by a palm (see WAX-PALM): though much used in Mexico, it has not yet become of commercial importance to other countries. It is used chiefly for candles in the churches. MYRTLE WAX was in former times much used in the United States as a material for candles: it is procured by boiling the berries of *Myrica cerifera* in N. America, and probably from other species in Brazil and at the Cape of Good Hope. It resembles bees-wax very much, except that it has a greenish-yellow instead of yellow color. It is used only for candle-making. See CANDLEBERRY.

Of the manufactured compounds called wax, the following are the chief: SEALING-WAX (q.v.); MODELLERS' WAX, used by artists for modelling small works—consisting of equal parts of bees-wax, druggists' lead-plaster, olive-oil and yellow resin, and just sufficient whiting added to produce the consistency of putty; GILDERS'

WAX—consisting of four parts of bees-wax, well mixed by melting with one part each of verdigris and sulphate of copper.

The bees-wax of commerce is of dirty-yellow color, and with many impurities: it has, consequently, to undergo a process of bleaching, by which it is rendered quite white and pure. The usual process is to melt the wax with boiling water, and stir them together for a short time, to separate the impurities from the wax. It is then allowed to rest for a short time, and the pure wax floats on the top; and when cold is taken off in a cake, the lower part of which is often discolored with the dirty water. This part is scraped off, and mixed with the next lot to be operated on. The purified portion is next remelted, and then allowed to trickle from the melting-pan on to a wooden cylinder, revolving rapidly, and partly immersed in pure cold water, in a large cistern. This throws it into the water in the form of fine thin feather-like flakes, which cool and harden instantly in the water. When all is run off, the wax is removed from the water, and laid on linen cloths, placed on tables in a field, for the air to bleach. From time to time the flakes are turned over and examined; and when the bleaching effect of the air seems to have ceased, the wax is remelted, and converted into flakes in the cistern, and replaced in the bleaching-ground until it is quite white.

WAX, MINERAL: natural product known under the name of Ozokerit. It was formerly found only in small quantities oozing from rocks of coal formation; though, near Edinburgh, candles, as curiosities, were made of it by the miners: but this hydrocarbon is now got in Wales, in Galicia and Roumania, in Utah and California, and has become an important commercial article for manufacture of candles. When found, it has a dark, rich-brown color, slightly greenish and translucent in thin films; but when refined it resembles well-bleached bees-wax. Its melting-point is about 60°.

WAXAHACHIE, *wăk-sa-hăch'ē:* town, county-seat of Ellis co., Texas; on the Missouri, Kansas and Texas and the Houston and Texas Central railroads; about 178 m. n.e. of Austin, the state capital, and 31 m. n. of Dallas. It was founded in 1847. It is in an agricultural and stock-raising region, in which are produced large crops of wheat and a good quality of cotton. The manufactories are cotton-seed-oil mills, cotton compresses, and flour mills. It is a cotton centre for an extensive region; its annual cotton receipts are about 65,000 bales. The principal public buildings are the county court-house (original cost $150,000), the banks, churches, and schools. There are six churches, Park High School (white), a high school for colored pupils, established 1893, public elementary and private schools, and a li-

brary. There are three national banks and one trust company. Pop. (1900) 4,215; (1910) 6,205.

WAX-BILL, or SENEGAL FINCH: an African weaver-bird (*Estrilda astrilda*), one of the section of the family called blood-finches on account of the prevalence of red in the plumage. This has long been a favorite among cage-birds, and is sold by dealers all over the world. It is nearly 5 in. long. The beak is bright red and somewhat swollen. A bright red stripe passes between the eyes, and the middle of the breast and belly is a beautiful reddish-brown. The upper surface of the body is brownish-gray, the lower surfaces lighter, everywhere traversed by very fine blackish wavy lines; wings and tail brown. They are varied much in color by breeders, bright blue tints, even, having been developed in some. Their song is not very interesting, but they are pretty and affectionate in a high degree. Their food and care should be similar to those given to a canary.

WAX-FLOWERS: flowers (and fruit) modelled in wax. The wax is bleached and prepared in thin sheets of various colors, which are cut out into the shapes for petals and leaves, according to the kind of flower to be imitated. They are usually made to adhere either by a slight heat or a little melted wax.

WAX-INSECT (*Coccus sinensis:* see COCCUS): very small white insect, native of China, of the same genus with the Cochineal and Kermes insects, and with the Scale-insects, valuable for the wax which it produces. It is found about the beginning of June on the branches of certain trees, particularly *Rhus succedaneum*, a kind of sumach, on whose juices it feeds. The wax is deposited on the branches as a coating like hoar-frost. This is scraped off toward the end of August, melted in boiling water, and strained through a cloth. See WAX. The Chinese Wax-Insect has been introduced by the French into Algeria.—The name Wax-Insect is applied also to several other wax-producing insects, such as the *Coccus ceriferus*, or Indian wax-scale; *C. Myricæ*, found at the Cape of Good Hope; *C. floridensis*, or wax-scale of Florida; *Cerococcus quercus*, which secretes masses of bright-yellow wax on oaks; and various insects of the family *Fulgoridæ*.

WAX-MYRTLE. See CANDLEBERRY.

WAX-PAINTING: same as Encaustic Painting (q.v.).

WAX-PALM (*Ceroxylon andicola*): lofty palm, found in the Andes, on the e. borders of Peru, 3,000 ft. and upward above sea-level. It grows to the height of 160 ft.; and on the cicatrices of the fallen leaves is produced an abundant resinous secretion, composed of about two parts of yellow resin and one of a kind of wax, more brittle than bees-wax. This wax exudes also from the leaves, and is whitish, almost inodorous, except when heated, when it gives out a resinous odor. It is used in

the country in which it is produced for making candles, but is usually mixed with wax or tallow. The usual method of obtaining the wax is by felling the tree. Each tree yields about 25 lbs. The wax is scraped off, melted, and run into calabashes. The timber of this palm is very hard and durable; the leaves are used for thatching, and the fibres for cordage. The tree is beautiful, with a stately stem, and head of large pinnate leaves.—In some n. provinces of Brazil, wax is obtained from the Carnahuba Palm (q.v.).

WAX-SCULPTURE: ancient application of wax in art. Not only have the tombs of s. Italy yielded many specimens of portraits of the deceased modelled in wax, but also many fine bronzes in antiquarian collections bear evident marks of having been modelled in wax by the process called *cire-perdue*. This consists in producing a model in wax, and then coating it with clay or other material in a soft state; this is allowed to harden; and the wax is then melted out by heat, and the molten metal poured in. A very fine cast of the wax-figure is thus obtained; but, of course, the wax-model of the artist is lost after the first copy is taken; hence such specimens are very highly prized by connoisseurs. During the 14th and 15th centuries, the art of modelling in wax, or ceroplastics, was much practiced, especially in Italy and in Germany, by many of the first artists, even Michael Angelo not excepted; and many of their original works in wax are still preserved. They are chiefly, however, in low relief, though very fine statuettes also were produced.

WAX-TREE: plant of the genus *Vismia*, nat. order *Hypericaceæ*, having a 5-parted calyx, and 5 petals, generally covered with soft hairs on the inside. All the species yield a yellow viscid juice when wounded, which, when dried, becomes somewhat similar to gamboge. The species are natives of tropical America. The name is also applied to *Rhus succedanea* and other trees from which wax is obtained. See WAX.

WAX'WING: bird of the genus *Bombycilla*, family *Ampelidæ* or Chatterers (q.v.), having a short straight, elevated bill, with very wide gape, as in the Fly-catchers, but without bristles; both mandibles notched at the tip; wings rather long, broad, and pointed; legs short; toes long, with sharp and curved claws. The name Waxwing is derived from a very peculiar character which the wings exhibit; some of the secondaries and tertiaries terminating in horny expansions of the shaft, resembling small pieces of red sealing-wax. The species are few, but widely diffused over the colder parts of the n. hemisphere. The only European species is the EUROPEAN WAXWING, or BOHEMIAN CHATTERER (*B. garrula*), found in summer in arctic regions of Europe, Asia, and America, migrating southward in winter, sometimes as far as

the shores of the Mediterranean, most abundant in America, during winter, about the great lakes and the northern valley of the Mississippi. It is found also in Japan. It is an occasional winter visitant of Great Britain, especially in severe winters. It is gregarious in winter, and the flocks are often large. It feeds on insects and worms, seeds, berries, and other fruits. It is a handsome bird, nearly as large as the Song Thrush; reddish gray, with black patch on the throat and black band on the forehead, tail-coverts brownish orange; primaries, secondaries, and tail-feathers tipped with yellow, two white bands on the wings; lower parts silvery gray. The head is surmounted by an erectile crest of brownish-orange feathers. The song is a weak whistling, bearing a little resemblance to that of the thrush. It is easily tamed. The flesh is said to be delicate food.—The AMERICAN WAXWING, or Cedar-bird (*B. cedrorum* or *Carolinensis*), is a very similar but smaller species, found only in N. America, less migratory, and never visiting arctic regions. The general color is reddish olive, passing into purplish cinnamon in front, and into ash-color behind; chin black; no white on the wings; lower parts yellow. It is crested like the European Waxwing. Great flocks of cedar-birds collect in the end of summer. They feed on berries, particularly those of the red cedar. The cedar-bird is extremely voracious, and, when food abounds, sometimes gorges itself so much that it may be taken by the hand. It is in much esteem for the table.—Another species is found in Japan, having no waxy drops on the wings.

WAXWORK, *wăks'wėrk:* the climbing Bitter-sweet, *Celastrus scandens,* a beautiful shrub remarkable for its orange colored, berry-like pods, which open and show a scarlet, shining aril enveloping the seeds—hence the name WAXWORK. It is a smooth and high-climbing shrub, with alternate, ovate-oblong, pointed, finely serrate leaves. The flowers are small, greenish white, in racemes terminating the branches. It grows wild in low moist ground from Canada to South Carolina, and w. of the Mississippi, and is cultivated for its showy fruit. The plant, either native or cultivated, comprises but two genera, *Celastrus* and *Euonymus,* the former having but one species, *Celastrus scandens.* The Latin name *Celastrus,* from the Greek *kelastros,* refers to the fruit remaining all winter.

WAX'Y DEGENERA'TION: morbid process in which the healthy tissue of various organs is transformed into a peculiar substance, allied in some respects to amyloid compounds, and in others to albuminous substances. Organs affected by waxy degeneration have some resemblance in consistency and physical character to wax. They may be cut into portions of the most regular shape, with sharp angles and smooth surfaces; and the thinnest possible slices may be removed by a sharp knife for

microscopical examination. Such organs are abnormally translucent, increased in volume, solidity, and weight. Usually the first parts affected by waxy degeneration are the small blood-vessels, the middle or muscular coat being first changed. Subsequently the secreting cells become similarly affected. When a solution of iodine is brought in contact with such tissues, a very deep violet red color is produced; and this deep-red color is alone a sufficiently characteristic test. Although amyloid degeneration is common to many tissues and organs, the parts most frequently affected are the spleen, liver, and kidneys. This morbid condition in one or more organs is the expression of a general pathological state, whose conditions and relations are as yet little known.

WAY, n. *wā* [Dan. *vei;* Dut. and Ger. *weg;* Goth. *vigs;* Icel. *vegr;* L. *via;* Skr. *vaha,* a way]: the road on which one travels, or by which some place may be reached; a passage; a road; a street; a route; length of space, as a long *way;* means of admittance; course; direction of motion or position; scope of action or observation; manner, custom, or means of doing or thinking; advance in life; humor; mode; method; progress; in *Scrip.,* the religion of Christians; Christianity. WAYS, n. plu. *wāz,* the timbers on which a ship is launched. WAY-BILL, a list of passengers and goods conveyed in a public conveyance. WAY-BOARDS, in *geol.* and *mining,* any thin layers or bands that separate or define the boundaries of thicket strata. WAY'FARER, n. *-fär-ėr* [AS. *faran,* to go]: a traveller; a passenger. WAY'FARING, a. passing; on a journey. WAYFARING-TREE, the mealy Guelder-rose (q.v.), or *Vībur'num lantāna,* ord. *Caprifoliācĕæ* (see VIBURNUM); the American Wayfaring-tree is the hobble-bush. WAYLAY, v. *wā-lā'* [*way,* and lay]: to lie in wait for in the way; to beset in ambush. WAYLAY'ING, imp. WAYLAID', pp. *-lād'.* WAYLAY'ER, n. *-lā'ėr,* one who waylays. WAY'LESS, a. *-lĕs,* pathless. WAYMARK, a mark or post to guide in travelling. WAY-TRAIN, a train that stops at all or most of the stations by the way; an accommodation-train. WAYWORN, a. wearied by travelling. To GIVE WAY, to yield; to fall; to break. To MAKE WAY, to give room for passing; to make a vacancy; to force or cut a path through. To MAKE ONE'S WAY, to advance in life by steady effort. To GO ONE'S WAY, to depart. To COME ONE'S WAY, to come to. BY THE WAY, in passing. BY WAY OF, as for the purpose of; as being. COVERT, or COVERED WAY, in *fort.,* a space about 30 ft. wide running round the outer edge of the main ditch, which affords protected communication between any two points. FAIRWAY: see under FAIR 1. HALF-WAY, to the point so as to be half finished or half arrived at, as to meet *half-way,* that is, to compromise. IN THE FAMILY WAY, with child. IN THE WAY, so as to fall in with, obstruct, or hinder. MILKY WAY: see under MILK. OUT OF THE WAY, beyond the sphere

of observation, so as not to fall in with, obstruct, or hinder; away from the usual or proper course; odd; unusual. PERMANENT WAY, the finished road-bed and track of a railway. RIGHT OF WAY, a right of passing over or through the ground of another; also exclusive right to pass along a particular way; precedence in passing. TO BE UNDER WAY, to be in motion, as when a ship begins to move; to be in progress. TO HAVE HEADWAY, motion forward, as a ship moving in its course. STERN-WAY: see under STERN 2. LEE-WAY: see under LEE. TIDE-WAY: see under TIDE. TO GO THE WAY OF ALL THE EARTH, to die. WAYS AND MEANS, methods; resources; in *parliamentary language,* means for raising money; resources for revenue. HIGHWAY, n. *hī'wā,* a wide road for traffic, made and maintained in good order at the public expense. *Note.—Way* or *ways* following *no,* forms a phrase meaning *in no manner* or *in no wise,*—as, 'he is *no ways* a match for him,' ''tis *no way* his interest.'

WAY, RIGHT OF, in Law: privilege of particular persons or the public to go to and fro through lands in private possession. The right of way through private property may belong only to the owners or occupiers of a neighboring estate and those desiring to have access to them; or it may belong to a whole community—e.g., when the way is the way to a place of general resort, as to a well, to a cemetery, etc. The right of way may arise through *prescription*—i.e., through immemorial use, or through use for a certain term of years, e.g., 20 years; or by *grant,* as when the owner of land expressly grants to another liberty to cross it; or through *necessity,* as where a parcel of land can be reached only through the estate of which it formerly was part; or through express *reservation* of the right when property is transferred; or through *custom,* as when boatmen on a navigable stream need to tow their boats along the banks. As right of way is acquired by prescription and uninterrupted use for a term of years, so it may lapse through non-use for 20 years; and it may be given up by agreement. A right of way acquired by prescription for a foot path is not right of way for a wagon-road.

WAYCROSS: city, county-seat of Ware co., Ga.; on the Savannah, F. and W. and the Brunswick and W. (Plant System) and Waycross A. L. railroads; about 95 m. s.w. of Savannah. It has manufactories of naval stores, lumber, flour, and agricultural and lumbering tools. The two banks have a combined capital of $100,000 and deposits (1903) $367,000. The educational institutions are a high school (white), established in 1890, a high school (colored), and public and private schools. Pop. (1890) 3,364; (1900) 5,919; (1910) 14,485.

WAYLAND THE SMITH (Ger. Wieland, *vē'länt;* Norse, *Völundr;* A.S. *Wêland*), a hero of old Teutonic saga. His myth assumes numerous forms. It appears in

Scandinavian, Anglo-Saxon, and German poems. The name probably signifies the 'skilful' or 'artful' one. Wayland seems to be a deification of the smith, whose calling was considered among the highest. Episodes in the story narrate that Wayland was, like Vulcan, lame, and, like Dædalus, manufactured wings and could fly. These are thought, however, to have been late introductions from the classic mythology. In France, too, Galans the Smith was known. Simrock employed the various legends in his epic *Wieland der Schmied* (1835). The megalithic monument in Berkshire called 'Wayland Smith's cave,' with the character Wayland, empiric, farrier, and pedlar, is familiar through Scott's *Kenilworth.*

WAYLAND, *wā'land,* FRANCIS, D.D., LL.D.: educator. 1796, Mar. 11—1865, Sep. 30; b. New York; son of Francis Wayland, Baptist minister of English birth. He graduated at Union College 1813; studied medicine 1813-16 divinity at Andover Theol. Seminary one year, and then was till 1821 tutor at Union College. He became pastor of a Baptist church in Boston 1821, and quickly won distinction as a pleasing orator and a deep thinker. His discourses on the *Moral Dignity of the Missionary Enterprise,* 1823, and on the *Duties of an American Citizen,* 1825, spread his fame throughout the country. He held a professorship in Union College 1826, and the next year was chosen president of Brown Univ., which post he held till 1855. His influence was felt in every department of the university, and students began to resort thither in great number. Besides holding the chief administrative office of the university, Wayland was prof. of political economy, psychology, and ethics; and by his lectures and talks awakened in his pupils and in the whole institution a quick interest in moral and intellectual matters. His lectures were not, as till then had been the custom at Brown, mere commentary on text-books, but the result of his own elaboration of the subject: thus his hearers were enabled to witness, and in a measure to coöperate in, the development of the master's philosophical system. Weekly he addressed the whole university from the pulpit, and very frequently joined the prayer-meetings and conducted Bible classes. The organization of the univ. was remodelled in accordance with Wayland's advanced ideas of a modern education 1850, and a larger liberty was accorded to the students in selecting courses of study. After his retirement from the presidency of Brown 1855, he was for some time pastor of a Baptist church in Providence, the remainder of his life was given to works of benevolence to the unfortunates in prisons and reformatories.—His published works are very numerous, treating of *Moral Science* (1835); *Political Economy* (1840); *Intellectual Philosophy* (1854); etc.

WAYLAND, FRANCIS, LL.D.: American legal scholar, son of the preceding: b. Boston, 1826, Aug. 23; d. New

Haven, Conn., 1904, Jan. 9. He was graduated from Brown University in 1846, took his M.A. degree from Yale in 1872, and began law practice in Worcester, Mass., in 1850, removing in 1858 to New Haven. He was judge of probate in 1864-5, and lieutenant-governor of Connecticut in 1869. In 1872 he became professor in the law school of Yale, and in 1873 dean of the school. In 1903 he resigned the deanship. The development of the school from a minor local institution to its present condition, with adequate financial basis and wide curriculum, is due chiefly to him. He was president of several organizations, including the American Social Science Association, the board of directors of the Connecticut State Prison, the Prison Aid Association from 1872 and the Organized Charities Association of New Haven from 1878. He was prominent as a writer and speaker on sociological and charitable topics and criminology, and was joint author, with his brother, H. L. Wayland, of the *Memoir* of President Wayland (1867).

WAYMENT, v. *wā-mĕnt* [a modification of *lament:* the first part of the word is due to int. *wo* or *woe*]: in *OE.,* to lament: N. in *OE.,* wailing; lamentation.

WAYNE, *wān,* ANTHONY: soldier: 1745, Jan. 1—1796, Dec. 15; b. Easttown, Penn.; descendant of an English farmer who settled first in Ireland and later in Chester co., Penn. Wayne was educated in an academy in Philadelphia, and became land-surveyor. He was one of the Pennsylvania delegates to a convention of representatives of the colonies to deliberate on their relations with England 1774, and to a similar convention 1775; during the same years he was member of the Pennsylvania colonial legislature and of its committee of safety. He was commissioned colonel of a Pennsylvania regiment 1776, Jan. 3, and was attached to the northern army under Gen. John Thomas. At Three Rivers, Wayne, though wounded and defeated, saved his command, and at Ticonderoga with his troops led the charge. As brigadier-general he joined Washington's army in New Jersey 1777, Feb.; and by his energy and address won from Washington the praise of 'bravery and good conduct.' At the battle of Brandywine, Wayne defended Chadd's Ford through the day, preventing the passage of the river by the Hessian troops; then he retreated in good order. While with a flying detachment Wayne harassed the British rear, he was attacked by a superior force; but bore the brunt of the British onset with his right wing, while he ordered the left to lead the retreat: the command was again in order of battle that night at no great distance from the scene of attack. He was court-martialed for his conduct of this affair, and was acquitted 'with the highest honor.' At Germantown, Wayne, commanding the right wing of the army, occupied by a charge the position assigned him, then drove the enemy two miles, when the order

was given to fall back. He directed with efficiency the foraging for the army at Valley Forge in the winter 1777-8, and brought in great spoil of horses, cattle, and miscellaneous supplies from within the enemy's lines. He hung on the rear of the royal commander Gen. Clinton, as he retired from Philadelphia. Wayne's command made the first attack at Monmouth, but was recalled by Gen. Charles Lee. When Washington took the chief command, Wayne achieved victory for the American arms. To Wayne was assigned by Washington the command of a light-infantry corps in the summer of 1779: among the brilliant achievements of Wayne's light infantry was the capture of Stony Point (q.v.), a memorable military *coup*. In recognition of his valor and generalship in this action, congress voted a gold medal to Wayne. He was sent the next year to capture Fort Lee, but, finding the place too strongly fortified, he ravaged the surrounding country and carried off cattle, horses, etc. A very serious mutiny among the troops of the Pennsylvania line was stilled by Wayne, who appeased the discontent of the soldiers. While under orders to join Lafayette in Virginia, Wayne attacked at Jamestown Ford a British force which seemed to be falling back to avoid conflict with Lafayette. The attack was made according to orders received from Lafayette, but Wayne found himself face to face with the entire British force. Retreat was impossible; so he made a charge on the enemy and then retired, having foiled a projected maneuver of the enemy against Lafayette. He had a prominent part in the investment and capture of Yorktown. He received the brevet rank of major-general 1783, Oct. 10. Wayne represented Chester co. in the Pennsylvania legislature 1784; was member of the Pennsylvania convention that ratified the United States constitution; settled on a grant of land in Georgia; was representative in congress from Georgia 1791-2; was appointed general-in-chief of the United States army 1792, Apr. 3. He commanded a force in the 'northwestern territories' 1793; and in two vigorous campaigns broke the power of the Indian tribes, and so gave peace to the frontier settlements. He was then appointed sole commissioner to treat with all the Indians of the northwest; while engaged in the duties of this post, he died of gout. His impetuosity in battle won for him the sobriquet 'Mad Anthony Wayne.' The aboriginals named him 'Black Snake,' a creature bold in attack, and seldom worsted.

WAYNE, Neb.: city, county-seat of Wayne co.; on the Chicago, St. Paul, Minneapolis & Omaha railroad; about 95 m. n. by w. of Lincoln and 85 m. n.w. of Omaha. It is in an agricultural region, in which the principal productions are wheat, corn, sugar-beets, and potatoes. Wayne makes extensive shipments of grain,

hogs, cattle, hay, and vegetables. It has Nebraska Normal College (private), a high school, and public graded schools. The four banks have a combined capital of $230,000. Pop. 2,500.

WAYNESBORO, Ga.: city, county-seat of Burke co.; on the Central Railroad of Georgia; about 100 m. n.w. of Savannah and 30 m. s. of Augusta. It was laid out as a town in 1783, and in 1888 was incorporated as a city. The chief manufactories are cottonseed-oil mills, wagon factory, agricultural implement works, and a cotton compress. It has seven churches, one public high school or academy, and Waynesboro Academy (a private high school), and elementary public schools. A battle was fought here during the revolutionary war, and one during the civil war. Pop. (1910) 2,729.

WAYNESBORO, Pa.: borough in Franklin co.; on the Mont Alto and West Maryland railroads; about 48 m. s.w. of Harrisburg. It is the commercial and industrial centre of quite an extent of territory. The chief manufacturing establishments are machine shops, creameries, ice-machine and engine works, plow factory. In 1900 (government census) Waynesboro had 61 manufacturing establishments, capitalized for $3,984,774. The number of employees was 1,103, and the annual cost of raw material used in the manufactories was $1,072,213; the value of the products (annually) was $2,731,059. The borough is near South Mountain and Antietam Creek. The Confederate army passed through Waynesboro on the way to and from Gettysburg. Pop. (1900) 5,396; (1910) 7,199.

WAYNESBURG, Pa.: borough, county-seat of Greene co.; on Ten Mile Creek and on the Waynesburg & Washington railroad; about 44 m. s. of Pittsburg. It is in an agricultural and stock-raising region, and in the natural-gas and oil belt. It has flour mills, a foundry, a planing mill, carriage factory, machine shop, and creameries. It is the seat of Waynesburg College (Cumberland Presbyterian). The five banks have a combined capital of $675,000. Pop. 2,700.

WAYNESBURG COLLEGE: located at Waynesburg, Pa., chartered in 1850 and first opened to students in 1851. It was established by and is under the control of the Pennsylvania Synod of the Cumberland Presbyterian Church, and the trustees are elected by this synod. In 1902 the board of trustees was increased from 11 to 21 members, and the Alumni Association empowered to submit 12 nominations, from which 6 trustees shall be elected. The college for many years labored under serious financial difficulties, and it was not until 1898 that an adequate endowment was obtained, which was increased in 1900. Since that time the curriculum has been extended, especially in the study of the sciences, and the equipment greatly improved. The college adopted the

system of co-education at the first, and has found it most successful. The students maintain two literary societies and a Young Men's and a Young Women's Christian Association. The buildings include the main building and Hanna hall, a dormitory. There are well-equipped chemical and biological and physical laboratories, recently established. The library contains 6,535 volumes, and the students numbered 300, and the faculty 21.

WAYS AND MEANS, COMMITTEE OF: in legislative assemblies, a number of members whose duty is to devise measures for raising the revenue needed for conducting the government: in the British house of commons the committee of ways and means is a committee of the whole house. In the United States house of representatives it is one of the standing committees, and consists of a number of members determined by the rules of the house, and chosen by the speaker of the house, who also names the committee's chairman. It is the most important of the house committees, except when circumstances temporarily elevate to first importance some other committee—e.g., the committee on banking and currency, in a time of financial crisis; or that of foreign affairs; or of military affairs, etc. Places on the committee of ways and means are given to leaders of the parties represented in the house; the chairmanship, being the most influential post in the house after the speakership, is always given to a foremost party leader, and commonly to some leader defeated in the canvass for the speakership. This committee is not only the foremost of the house committees—it is distinctive of the house of representatives; for the senate, not being charged with the duty of raising the money needed by the government, has no committee of ways and means. Projects of taxation, direct or indirect, whether of domestic products or of importations, are considered and formulated by the committee of ways and means; around its deliberations are centred all the public and private interests concerned in questions of free-trade or protection, etc.

WAYWARD, a. *wā'wĕrd* [Eng. *way*, and AS. *weard*, in the direction, toward]: bent on one's own way; wickedly forward; perverse; wilful. WAY'WARDLY, ad. *-lĭ*. WAY'WARDNESS, n. *-nĕs*, forwardness; perverseness.

WAYWODE, or WAIWODE. See VAIVODE.

WAZAN, Morocco: an island town, picturesquely situated on the steep northern slope of a two-peaked mountain, in the hill country 90 m. s.e. of Tangier. It is a sacred city of refuge, and a place of pilgrimage, the headquarters of the grand sherif, the spiritual ruler of Morocco. The principal buildings are the great mosque and the tombs of a long line of sherifs. The trade is, as elsewhere in Morocco, mainly in the hands of the Jews. Pop. 20,000.

WAZIRISTAN: the country of the Waziris, n.w. India, a mountainous region situated west of the Suliman range, n. of British Baluchistan, and e. of Afghanistan. It is now partly included in British India, and has at various times been the scene of military operations owing to the depredations and raids of the Waziris on the caravans traversing the Gomul Pass. It is a mountainous country, with much fine scenery, and a delightful climate except in some of the valleys. The Waziris, a portion of whom are known as Mansuds, are a hardy race of Afghans. It is estimated that they number about 44,000 fighting men. Some of them have settled peaceably within British territory, where they cultivate 27,000 acres and pay a revenue of $4,500. Their crops are wheat, maize, and barley; they raise horses and sheep, and iron and wood are exported.

WE, pron. *wē* [AS. *we;* Dan. and Sw. *vi;* Dut. *wij;* Ger. *wir;* Icel. *vér*]: plu. of the personal pronoun I, equal to 'I and another or others; 'he (or she, or they) and I.' *Note.—We* is used by sovereigns in addressing their subjects instead of the more familiar I; also by authors, editors, and the like, with the view of avoiding the appearance of egotism.

WEA [contraction of *Wayatonuki,* 'Eddy people']: a tribe of the Algonquin stock of North American Indians, belonging to the Miami confederacy. When first known to the whites, in 1672-1703, they were in Wisconsin, but they seem to have gradually drifted southward, and in 1701 one of their villages was on the site of the present Chicago, Ill., and in 1719 their chief village was on the Wabash below the mouth of Wea Creek, in Indiana. They were hostile against the whites in western Virginia, in which their country was situated, but they finally signed the celebrated treaty of Greenville in 1795, and in 1820 sold their last lands in Indiana and moved with the Piankashaws to Illinois and Missouri. In 1832 they again sold their lands and the main body moved to Kansas, whither a few of their number had already migrated. In 1854 the rapidly decreasing Weas and Piankashaws united with the Peorias and Kaskaskias of the Illinois confederacy; at this time their population aggregated 259, largely mixed-bloods. In 1868 they moved to the Neosho in Indian Territory, where they have since remained. The Miami number 110 and the Peoria 185, but the population of the Weas is not separately recorded.

WEAK, a. *wēk* [AS. *wác,* pliant: Icel. *veykr,* weak: Dan. *veg;* Sw. *vek,* pliant: Ger. *weich;* Dut. *week,* soft, yielding to the touch]: yielding to or giving way under pressure; having little physical strength; feeble; infirm; easily broken; yielding; not strong; faint or low, as sound; not furnished with sufficient ingredients, as *weak*

tea; thin; diluted; unfortified; not well supported by reason or argument; not having moral force; not strong in character. WEAK'LY, a. *-lĭ*, not strong; not healthy: AD. feebly; faintly; injudiciously; indiscreetly. WEAK'NESS, n. *-nĕs*, want of physical strength; want of force or vigor; want of moral force; feebleness of mind; want of judgment; failing; fault; defect. WEAK-HEARTED, WEAK-SPIRITED, a. timorous; cowardly. WEAK SIDE or POINT, that part of a person's natural disposition by which he is most easily biassed or won; a foible. WEAKEN, v. *wēk'n*, to impair the strength of; to enfeeble; to enervate; to debilitate; to grow weak. WEAKENING, imp. *wēk'nĭng*. WEAKENED, pp. *wēk'nd*. WEAK'ENER, n. *-nėr*, one who or that which weakens. WEAK'LING, n. a feeble creature.—SYN. of 'weakness': failure; imperfection; foible; frailty; infirmity; feebleness; debility; languor; imbecility; decrepitude; faintness.

WEAKFISH, or SQUETEAGUE: a spiny-rayed fish of the genus *Cynoscion* and family *Sciænidæ*. It has no teeth on the vomer or palate bones, but numerous ones in the jaws, one or two in the front of the upper jaw, having the form of elongated canines; the head is convex, supported by cavernous bones; the air-bladder has a horn on each side projecting forward. The genus is chiefly American, with about 15 North American species. The common weakfish (*C. regalis*) is 1 to 2½ feet long, brownish blue above, with irregular brownish spots, and tinged with greenish and banded in the young; the sides silvery, abdomen white, and iris yellow; lower fins orange; a single row of very small teeth in the upper jaw, and a double series in the lower; dorsals separated, and the second, with the caudal and anal, mostly covered with scales. This is one of the most abundant fishes along the entire Atlantic coast from Cape Cod to Florida, but there have been times when the invasions of bluefish have driven them from parts of the coast. The name originated from the little resistance it makes when taken, and from the ease with which the delicate structure of the mouth enables it to break away. This is the name most employed on the New Jersey coast, while in New England the Indian name 'squeteague' is usual, and in the South sea-trout is applied to this and to the spotted *Cynoscion*. On the New Jersey coast it appears early in the spring, being most abundant toward the end of July, and disappears late in the autumn; it is a greedy biter, and is easily taken by any soft white bait, affording great sport for about an hour on the flood tide; it swims in shoals near the surface, and requires a line slightly if at all leaded. In summer it is abundant about the mouths of rivers, where the water is brackish, and sometimes ascends far up, having been taken in the Hudson above Sing Sing; it is taken by seins and pound-nets in

large quantities; when caught it makes a croaking sound, also heard when the fish is at the bottom. The flesh is wholesome and well flavored, but so quickly gets soft that it does not rank high in the market. The air-bladder makes excellent isinglass for culinary purposes. The spotted weakfish (*C. nebulosus*) is conspicuously marked with round black spots above and the soft-dorsal fin is not scaly. It is more southern than the squeteague, and is sometimes called spotted trout. Other related species occur in West Indian waters and on the Pacific coast.

WEAL, n. *wēl* [AS. *wel*, well; *wela*, abundance: OHG. *wela*, wealth: Dan. *vel;* Sw. *väl;* Ger. *wohl*, welfare]: a sound or prosperous state; happiness; prosperity; welfare; in *OE.*, state; public interest. WEAL OR WOE, prosperity or adversity. WEALTH, n. *wĕlth*, riches; large possessions; an extraordinary abundance of this world's goods (see CAPITAL: also POLITICAL ECONOMY, with its references so far as relevant): affluence; in *OE.*, prosperity; external happiness. WEALTH'Y, a. *-ĭ*, rich; having possessions greater than the generality of men; opulent. WEALTH'ILY, ad. *-lĭ*, in a wealthy manner; with wealth; richly. WEALTH'INESS, n. *-nĕs*, state of being wealthy. THE WEALTHY, persons in opulent circumstances. WEALSMAN, n. *wēlz'măn*, in *OE.*, a statesman; a politician. COMMON OR PUBLIC WEAL, the welfare of the state.

WEAL, n. *wēl:* a spelling of WALE and WHEAL 1 (q.v.).

WEALD, n. *wēld*, or WOLD, n. *wōld* [AS. *weald;* Ger. *wald*, wood, forest]: a wood or forest; the low country lying between the North and South Downs of Kent and Sussex in England. WEALDEN, a. *wēld'n*, pertaining to the weald of Sussex and Kent. WEALDEN GROUP OR STRATA, in *geol.*, that series of freshwater strata which occur between the uppermost beds of the oölite and the lower ones of the chalk formation—so called from the *weald* of Kent and Sussex, being the chief area in Great Britain of the strata of that formation (see WEALDEN FORMATION).

WEAL'DEN FORMATION, in Geology: series of freshwater strata belonging to the lower Cretaceous epoch. Having been studied originally in England, in the parts of Kent, Surrey, and Sussex called the Weald, this local name was given to the formation. It has been divided into two series, which do not differ materially from each other—Weald Clay, 560 ft.; Hastings Sand, 740: total 1,306. The Weald Clay consists of blue and brown clay and shale, with thin beds of sandstone and shelly limestone. These strata were probably lake or estuary deposits, and contain remains of the land flora and fauna, often in great abundance. The beds of limestone, called Sussex Marble, are almost entirely composed

of a species of *Paludina*, not very different from the common *P. vivipara* of English rivers. The clays are often laminated by thin layers, consisting of immense numbers of the shells of minute *Cyprides*. But the most remarkable animal remains are those of the huge reptiles, Pterodactyl (q.v.), and the numerous species of turtles. The vegetable fossils belong chiefly to ferns, and to the gymnospermatous orders of Conifers and Cycads; the fruits of several species of both orders have been found; and in some places the rolled trunks of *Endogenites* and such as the Iguanodon (q.v.), Hylæosaurus (q.v.), *Clathraria*, belonging to Cycads, and of different species of coniferous wood, occur in enormous quantities, as at Brook Point, in the Isle of Wight, where the shore at low water is strewn with them.

The Hastings beds contain more sandstone and less clay than those of the upper Weald Clays. The remains of the huge Wealden reptiles abound in the sandstones of this division. The Tilgate forest-beds, where the Iguanodon was first found, and the rocks in the neighborhood of Hastings, are the best known repositories of those fossils.

The deposition of the Wealden beds was followed by a gradual depression of the land, when these fresh-water deposits were covered by the estuary beds of the newer *Greensand*. The depression continued until the fresh-water and estuary strata formed the bottom of a deep sea, on which were deposited the immense beds of chalk and allied strata which form the bulk of the Cretaceous series. In the process of elevation, these beds have suffered denudation, so that districts which were covered with Cretaceous beds have been cleared of them, and immense valleys have been furrowed through the Chalk, Greensand, and Wealden.

WEALTH, WEALTHY. See under WEAL.

WEALTH OF THE WORLD: the total wealth of the world, while not exactly known, has been estimated at $500,000,000,000. This is probably an underestimate of the actual amount of money and property in civilized and semi-civilized lands. Of this total, the greater part is owned by Americans and Europeans. The United States has somewhere near $100,000,000,000, or about one-fifth of the whole. Among foreign nations the total wealth has been estimated as follows:

Great Britain	$59,000,000,000
France	48,000,000,000
Germany	40,000,000,000
Russia	32,000,000,000
Austria-Hungary	27,000,000,000
Italy	16,000,000,000
Spain	12,000,000,000
Scandinavia	7,000,000,000
Belgium	5,000,000,000

The percentage of public debt per capita of European countries has been estimated as follows:

Countries	Population	Debt per capita
Austria-Hungary (1901)	45,242,889	$ 24
Austria (1901)	26,150,597	27
Hungary (1900)	19,092,292	54
Belgium (1901)	6,693,810	75
Bulgaria (1899)	3,733,189	13
Denmark (1901)	2,464,770	24
Greece (1900)	2,434,000	68
Holland (1901)	5,179,000	88
Italy (1900)	32,449.754	83
Norway (1900)	2,239,880	28
Portugal (1901)	5,428,659	166
Roumania (1901)	5,912,520	46
Servia (1900)	2,493,770	32
Spain (1901)	18,226,040	100
Sweden (1901)	5,175,228	17

The total wealth per capita of various countries is as follows:

Great Britain	$1,442
France	1,257
Germany	709
Russia	296
Austria-Hungary	499
Italy	485
Spain	548
Belgium	739
Portugal	417
Greece	485
Australia	1,228
United States	1,123
Denmark	1,104
Canada	949

WEAN, v. *wēn* [Dan. *vænne;* OHG. *wennan;* Ger. *gewöhnen;* Icel. *venja;* Sw. *vänja;* Dut. *wennen,* to accustom]: to accustom to do without, as a child the breast; to alienate, detach, or withdraw, as the affections from some object of desire; to reconcile to the lack or loss of, as to *wean* one's self from the world: N. in *prov. Eng.* and *Scot.,* a child; an infant. WEAN'ING, imp.: N. the act of accustoming a child to do without its mother's milk. WEANED, pp. *wēnd.* WEAN'LING, n. *-lĭng,* a child or animal newly weaned: ADJ. newly weaned.—*Weaning, and Feeding in Infancy,* are subjects for medical consideration and advice. The propriety of mothers nursing their own children is now so generally acknowledged that it is the duty of the physician less frequently to urge maternal nursing than to indicate those cases in which it is necessary to substitute another mode of rearing the infant. Any mortal or weakening disease—e.g., phthisis or epilepsy—obviously disqualifies from the office of nurse. Some mothers in other respects healthy have breasts incapable of secreting a sufficient supply of milk: in other instances, the breast may perform its functions well, but the nipple may be naturally so small, or so completely obliterated by pressure of tight stays,

as not to admit of its being laid hold of by the child. These are actual physical hindrances to nursing. Again, women may frequently possess such sensitive and excitable temperaments as will render it imprudent for them to suckle their own children. Frightened and excited by every accidental change in the infant's countenance, and inordinately moved by the common agitations of life, such persons are kept in a continual fever, which materially interferes with the formation of milk both as to quantity and quality. Women, also, who become mothers for the first time at a late period of life seldom make good nurses, though it is better that they try to suckle the child than to subject it to the risks of artificial feeding. In ordinary cases, the child should be put to the breast as soon as the breast begins to contain anything; and when the secretion of milk has fairly commenced the child will require no other food until the seventh or eighth month, provided the mother be a good nurse. During the first five or six months, the infant should be put to the breast at regular intervals of about four hours; afterward, when the teeth are beginning to appear, the child need not suck more than four times in the 24 hours, some artificial food being given to it twice during the same period. This at first may consist of soft bread steeped in hot water, with addition of sugar and cow's milk; and subsequently a little broth, free from salt and vegetables, may be given once a day. The spoon is now the best medium of feeding, as the food should be more solid than could be drawn through the bottle. The time of weaning should be that indicated by nature, when the child, being provided with teeth, has the means of obtaining its nourishment from more solid substances. If the infant has been gradually accustomed to less of maternal and more of artificial food, weaning will be comparatively easy. Suddenness in the change will usually occasion suffering both to parent and to child. The ordinary period of weaning varies from the 7th to the 12th month; sometimes the child is kept at the breast for a much longer period, from the popular idea that lactation prevents pregnancy; but such unnaturally prolonged lactation is usually injurious to both mother and child.

In those cases in which it is inexpedient or impossible for a mother to suckle her own child, the choice of a wet-nurse becomes important. The following gives the substance of practical rules for selecting a nurse: the first thing to be looked to is to ascertain that both the woman and her child are in good health. Of this, judgment must be made by the following signs: The woman's general appearance and form ought to be such as betoken a sound constitution. Her skin should be free from eruptions; her tongue clean, and indicating a healthy digestion; her gums and teeth sound and perfect; the breasts should be firm and well formed—not too large or

flabby—and with perfect, well-developed nipples. The milk should flow freely, on slight pressure: a little of it should be allowed to remain in a glass, that its quality may be examined. It should be thin and of bluish-white color; sweet to the taste; and, when allowed to stand, should throw up considerable cream. A nurse should not be old, but it is better that she should have had one or two children before; as she will then be likely to have more milk, and may be supposed to have acquired experience in management of infants. Examination should be had likewise of the nurse's child, which should be well nourished, clean, and free from eruptions, especially on the head and buttocks: its mouth should be entirely free from sores or aphthæ. If both woman and child bear such an examination, the woman will be likely to prove a good nurse. On the question as to how recent should have been the nurse's own confinement, there is some difference among authorities: it is best, however, that the age of the milk should correspond to the age of the infant—i.e., that an infant taken at any given age from its mother, before the normal period of weaning, should be provided with a nurse who was confined about the same time as its own mother.

A wet nurse is very much preferable to any kind of *artificial feeding;* but peculiar cases may occur in which it is impossible to procure a nurse; or an infant whose mother is incapable of nourishing it may be the subject of a disease that may be transmitted through the infant to the nurse. In these cases, a food must be provided as nearly as possible resembling the natural food; and this is naturally sought among the food of animals. The milk of the cow is most commonly used, being most easily obtained; but ass's milk more nearly resembles human milk, as is shown from the following comparative analyses by Prof. Playfair:

	Woman.	Cow.	Ass.
Casein	1.5	4.0	1.9
Butter	4.4	4.6	1.3
Sugar	5.7	3.8	6.3
Ashes	0.5	0.6	...
Water	88.0	89.0	90.5

The most important difference between cow's milk and woman's milk is the great excess of casein in the former. The former fluid may, however, be made to resemble the latter in composition in either of the following ways: (1) On gently heating cow's milk, a membrane of casein forms on the surface; by removing two or three of these membranes as they form, we can reduce the quantity of casein to the desired extent; or (2) cow's milk may be diluted with twice its bulk of pure water, and a little sugar added. This food should be administered at a natural temperature (of about 98°) through a sucking-bottle; and as the child grows older, it will soon be able to take natural cow's milk without inconvenience.

The rules regarding the times, etc., of feeding after weaning are similar to those laid down for sucking. For some months after weaning, the food should consist principally of semi-fluid substances, such as milk thickened with baked flour, or pap, to which a little sugar should be added. Light broths also may be administered, especially in the occasional cases in which milk seems to disagree; and bread and butter may be tried in small quantity. Young mothers may take note of the following dietary for a weaned infant.—A healthy child, two or three years old, commonly awakes hungry and thirsty at 5 or 6 A.M., sometimes earlier. Immediately after awaking, a little bread and sweet milk should be given to it, or (if the child is too young to eat bread) a little bread-pap. The latter should be warm; but in the former case the bread may be eaten from the hand, and the milk allowed to be drunk cold, as it is well at this meal to furnish no inducement for eating beyond that of hunger. After eating, the child will generally sleep again for an hour or two; and about 9 A.M. it should get its second meal, of bread softened in hot water, which latter is to be drained off, and fresh milk and a little sugar added to the bread. Between 1 and 2 P.M. the child may have dinner, consisting, at the younger ages, of beef, mutton, or chicken broth (deprived of all fat), and bread. When a sufficient number of teeth are developed to admit of chewing, a little animal food, as chicken, roast or boiled mutton, or beef, not too much dressed, should be allowed, with a potato or bread, and some fresh, well-dressed vegetable. After dinner some drink will be requisite; and a healthy child requires, and indeed wishes for, no drink but water. Between 6 and 7 P.M. the child may have its last meal, of bread, steeped in water, etc. (as at 9 A.M.). A healthy child which has been in the open air during the greater part of the day will be ready for bed shortly after this last supply, and will require nothing more till next morning. Similar regimen and hours may be adopted throughout the whole period of childhood; only, as the fourth or fifth year approaches, giving, for breakfast and supper, bread and milk without water, and either warm or cold, according to the weather or the child's inclination. The supply of food on first awaking in the morning may be gradually discontinued, and breakfast be given somewhat earlier.

WEAPON, n. *wĕp'n* [Sw. *vapen;* Dan. *vaaben;* Ger. *waffe;* Icel. *vápin;* AS. *wæpen,* a weapon: Dut. *wapen,* arms, tools: Goth. *vepna,* arms]: an instr. of offense or defense; an instr. of war; PLU. arms; thorns, stings, etc. WEAP'ONED, a. furnished with weapons or arms. WEAP'ONRY, n. *-n-rĭ,* a supply of weapons or instr. of war.

WEAR, v. *wär* [Ger. *währen;* Icel. *vera;* Sw. *wara,* to last, to wear: OHG. *weren,* to remain, to endure]: to

last, endure, or hold out during a longer or shorter period; to waste or diminish by use or time; to be wasted or impaired, as by use; to pass or be consumed by slow degrees: N. injury or decay by use; the act of lasting long. WEAR'ING, imp. WORE, pt. *wōr*. WORN, pp. *wōrn*. TO WEAR AWAY, to consume; to impair or diminish by gradual decay. TO WEAR OUT, to use till decayed or done; to exhaust; to come or bring to an end; to harass. TO WEAR OFF, to rub off by use; to pass away by degrees; to go off gradually. WEAR AND TEAR, loss or waste by use.

WEAR, v. *wär* [Icel. *verja;* AS. *werjan*, to defend, to cover: OHG, *werjan*, to defend, to clothe]: to carry or bear upon the person, as an article of clothing, arms, or any ornament; to have or exhibit an appearance of; to bear; in OE., to protect; to guard; watch: N. in *OE.*, manner of dressing; hence, fashion; mode; things to be worn, as under*wear*. WORE, pt. *wōr*. WORN, pp. *wōrn*. WEARABLE, a. *wär'ă-bl*, that can be worn. WEAR'ER, n. *-ėr*, one who or that which wears. WEARING APPAREL, garments for the person; articles of dress. TO WEAR THE BREECHES, in *familiar language*, said of a wife who assumes the authority of her husband, or domineers over him. WEAR'ING, n. in *OE.*, clothing.

WEAR, v. *wär* [a corruption of *veer*]: used in the phrase, 'to *wear* a ship'—that is, to turn the ship on a different tack by bringing her stern (and not her bow) into the wind. WEAR'ING, imp. WEARED, pp. *wärd*.

WEAR, or WEIR, n. *wēr* [Ger. *wehren*, to ward off, to prevent; *wehr*, a dam, a dike: AS. *wer*, a dam for fish]: a dam across a river to raise the water in order to conduct it to a water-wheel, or to irrigate land, etc.; a fence in a stream for catching and keeping fish.

WEARE, *wär*, MESHECH: jurist: 1713, June 16—1786, Jan. 15; b. Hampton, N. H. He graduated at Harvard 1735, studied law, and was admitted to the bar; was a member of the legislature and speaker of the house; commissioner to the colonial congress at Albany 1754; subsequently a judge of the supreme court, and 1777 chief justice of the superior court of judicature. He was also colonel of a militia regiment, and when the Revolution opened was appointed chairman of the Committee of Public Safety. Upon the reorganization of the state judiciary he was placed at its head. He raised troops for defense against Burgoyne, whose invasion he materially aided in repelling. In 1776, under the temporary constitution, he was elected president of the state, and was annually re-elected until 1784. Under the new constitution he was again elected president, but resigned before the expiration of his term.

WEARY, a. *wēr'ĭ* [AS. *werig*, weary: Ger. *währen;* Dan. *vare*, to endure: from WEAR 1, which see]: having

the strength exhausted by toil or long continued exertion; exhausted by mental efforts; impatient of the continuance of something irksome or disagreeable or which one desires to discontinue or abandon; causing weariness; irksome: V. to reduce or exhaust by physical or mental exertion; to fatigue; to harass; to render impatient of continuance. WEAR'YING, imp. WEAR'IED, pp. *-ĭd.* WEAR'IABLE, a. *-ĭ-ă-bl,* that can be wearied. WEAR'ILY, ad. *-ĭ-lĭ,* in a weary or tiresome manner. WEAR'INESS, n. *-nĕs,* exhaustion by labor too protracted; lassitude. WEAR'ISOME, a. *-sŭm,* tedious; fatiguing. WEAR'ISOMELY, ad. *-lĭ.* WEAR'ISOMENESS, n. *-nĕs,* the quality or state of being exhausted by exertion. TO WEARY OUT, to subdue by fatigue.—SYN. of 'wearisome': irksome; tiresome; annoying; vexatious; troublesome;—of 'weary, a.': jaded; tired; tiresome; fatigued; fagged; spiritless.

WEASAND, n. *wē'zănd* [AS. *wæsend;* OHG. *weisunt;* Fris. *wasendc,* the windpipe: Icel. *hvæsa,* to make a sound in breathing (and see WHEEZE)]: the windpipe; throat; also spelled WESAND.

WEASEL, n. *wē'zĕl* [Ger. *wiesel;* Dan. *væsel;* Sw. *vessla;* Dut. *wezel,* a weasel]: a small carnivorous animal having short legs and a long slender body; a stoat. WEASEL-FACED, a. thin and sharp in the face like a weasel.—The *Weasel* belongs to the genus *Putorius* (formerly *Mustela,* which is now confined to the martens and sable), family *Mustelidæ* (q.v.); and has a very elongated body; short feet, with toes quite separate, and sharp claws; premolars 3 on each side, above and below (one less, above and below, than *Mustela*), making in all 18 premolars and molars. The COMMON WEASEL (*M. vulgaris*) is a native of almost all temperate and cold parts of the n. hemisphere, except the most arctic regions. Its range does not extend quite so far n. as that of the ermine. The length of head and body varies from 6 to 8 in., and the tail vertebræ from 2 in. to less than one. The tail is pointed, with no dusky or black tip except in some Pacific-coast specimens. Unlike the ermine, the under parts are rarely if ever tinged with sulphur-color. The feet may be white like the belly or mahogany-brown like the back. The species turns white in its northern range, as far s. as northern New England, where it is less common than the ermine. The female is smaller than the male. The weasel is nimble and active, bold yet wary; it is a most persevering hunter, with scent as keen as its sight, quarters the ground like a dog, and wearies out animals larger and apparently much stronger than itself. It preys on mice, rats, voles, small birds, and other small animals, sometimes even on hares and rabbits, robs birds' nests, devouring the young birds or sucking the eggs, and is occasionally troublesome in poultry-yards, killing young chickens. It climbs walls and

trees with great agility, and does not hesitate to plunge into water in pursuit of the water-rat. It sometimes begins by abstracting the blood of the animal which it has killed, and generally devours the brain; but when food is abundant, it carries the body to its retreat, where a considerable quantity of prey is often found, the W. preferring to eat it in a half-putrefied state. The W. generally sleeps during the day, and is most active at night. It has a disagreeable smell, strongest in hot weather, or when it has been pursued or irritated. It is capable of being tamed when taken young, and becomes docile and gentle. The female W. makes a nest of straw-leaves and moss for her young—which are produced in spring, four or five in a litter—often in a crevice of a bank, or in a hollow tree. The fur of the W. is an article of commerce in some northern countries, and W.-skins are exported in considerable quantity from Siberia to China. In the old world, it is said, the W. rarely becomes white in winter.—The Ermine (q.v.), or Stoat, is another species of weasel, varying from 8 to 11 in., exclusive of the tail, which is 2 to 5 in., brushy and black-tipped.—*P. pusilla* of De Kay (*pusillus* of Aud. and Bach.) is discarded as a small *P. vulgaris*.—The Long-tailed W. (*P. longicauda*), from Minn. w. and s.w., size of the ermine, has the brown of the back with olivaceous tinge, and the tawny or buffy under parts and feet with salmon tinge.—The Bridled W. (*P. frenatus*), Tex. and Or. to Guatemala, has the top of the head darker and blotched with white; a variety *brasiliensis* is found in Brazil.

WEATHER, n. *wĕth'ĕr* [Dut. *weder;* Ger. *wetter;* Icel. *vedr*, weather, wind: Pol. *wiatr*, wind: Ger. *wehen*, to blow]: the state of the atmosphere at any given time, with respect to heat, cold, wetness, dryness, etc. (see METEOROLOGY: ETC.); in *OE*, a storm of wind and rain: V. among *seamen*, to get to the windward of; to sail against the wind past something, as a ship doubling a cape or promontory; to bear up against; to endure and resist; to gain against opposition; to waste by attrition, as rocks; in *OE.*, to expose to the air. WEATH'ERING, imp. passing with difficulty: N. the action of the atmosphere on rocks, etc., that lie exposed; a slight inclination given to the top of cornice or molding to prevent water from lodging on it. WEATH'ERED, pp. a. *-ĕrd*, passed with difficulty; in *geol.*, wasted, worn away, discolored, or covered with lichens by exposure to the influences of the atmosphere, as rock-surfaces. WEATHER is used as the first part of many compounds in the language of seamen, signifying 'toward the wind' as in WEATHER-BOW, WEATHER-QUARTER, WEATHER-SIDE, etc. WEATH'ERLY, a. *-lĭ*, working well to the windward. WEATH'ERMOST, a. *-mōst*, furthest to windward. WEATHER-BEATEN, a. seasoned by exposure to every kind of weather; showing the results of exposure or the effects of bad weather. WEATHER-BOARD, the side of a ship which is toward the wind; a thin, feather-edged board in general wider than a clapboard but like it used overlappingly as an outside covering for the walls of a frame building: V. to nail

boards on so to overlap one another in order to exclude rain, snow, etc. WEATHER-BOARDING, the act of nailing up boards which overlap one another; the boards so nailed. WEATHER-BOUND, a. delayed by bad weather. WEATHER-COCK, a figure on the top of a spire which turns by the wind and shows its direction—so called because often made in the form of a cock; a vane; anything fickle or changeable. TO HAVE OR KEEP ONE'S WEATHER-EYE OPEN, to be wide awake; to be on the alert and have one's wits about one. WEATHER-GAGE, the position of a ship to the windward of another; a position of advantage or superiority. WEATHER-GLASS, an instr. which indicates the state of the atmosphere or changes of weather; a name popularly applied to the barometer. WEATHER-MOLD or MOLDING, a cornice over a door or window to throw off the rain. WEATHER-PROOF, that protects against rough weather. WEATHER-TIDE, the tide which sets against the lee side of a ship, driving her to the windward. WEATHER-WISE, skilful in foreseeing the changes of the weather. WEATHER-WORN, in *geol.*, wasted or worn away by the action of the weather. STRESS OF WEATHER, violent and unfavorable winds. TO WEATHER A POINT, to gain a point against the wind: to accomplish against opposition. TO WEATHER or WEATHER OUT, to pass through unscathed or without serious damage, as a ship through a storm; to encounter and pass through successfully though not without difficulty. WEATH'ERFEND, v. *er-fĕnd* [see FEND]: in *OE.*, to ward off or defend from the weather; to shelter.

WEATH'ER: condition of the atmosphere, at any time in respect of heat, moisture, wind, rain, cloud, and electricity: a change of weather implies a change in one or more of these elements. For the possibility and mode of making real predictions of the weather, see STORMS: for the system of weather forecast, see METEOROLOGY.

The great changes of solar heating attending the alternation of day and night, and the annual march of the seasons, produce well-marked and predictable changes of weather in all parts of the world. There are indeed many tropical and sub-tropical regions of the earth where there is so much of regularity in several or all of the weather elements that the experience of preceding years forms a trustworthy guide by means of which the weather may usually be closely forecasted for a considerable time in advance. For example, the daily march of the barometric pressure at many tropical stations is so regular that the time of day can be told pretty closely by reading the barometer. But, on the other hand, large irregular fluctuations of barometric pressure, rainfall, and temperature prevail over a great portion of the earth, and in these regions there is as yet no sound system of local weather prediction for more than two days in advance.

The proximity of w. Europe to the Atlantic makes it

impossible in that region to predict the weather beyond a day or two at the utmost, except in the case of considerable storms leaving the American coast and likely, if not certain, to strike widely on the coast of Europe. In Norway and the Baltic, and places toward e. Europe, the weather may be predicted for a longer time, owing to the more easterly situation. In America also, where storms advance chiefly from w. to e., gales and unsettled weather are predicted for places on the seaboard in the e. some days before; though the course that a storm may take, whether more to the n. or to the s., cannot be certainly foretold.

A forecast, conjectural indeed, yet often useful, may be made by observing the barometer, the winds, and the face of the sky — especially the cirrus cloud, most elevated and delicate of the clouds; but some previous knowledge of the general features of Storms (q.v.) is indispénsable: these specially—(1) Storms have a circular area, and (2) advance in an easterly direction, bearing a low barometric pressure with them. (3) Winds blow from a high to a low barometer — the observer, standing with his back to the wind, having always the low barometer to his left in the n. hemisphere — and (4) with a force proportioned to the difference of the pressure, or to the steepness of the barometric gradient. (5) Storms are noticed first in the upper regions of the atmosphere, or in the region of the cirrus cloud. (6) In front of the storm the air is warm and humid; in the rear of it, cold, or cool and dry. With such observations, requiring only a barometer intelligently interpreted, particularly if hills form part of the landscape, the character of the weather may be foreseen for one day, or even on occasions longer. In general a falling barometer is not followed certainly by storm; but a rising barometer in bad weather indicates the passing away of the storm, though, in the colder season, possibly not without a change to higher winds and snow.

To the agriculturist and horticulturist, not high winds but hails, heavy rains, frosts, and fine weather are what are required to be known. Such forecasts were begun in the United States by Gen. Albert J. Myer; also in France by Leverrier shortly before his death: and they are gradually being introduced over the continent of Europe.

The weather prognostics of every language embrace much that is shrewd and of considerable value, but more that is vague and absurd. The changes of the moon long were, and in many minds still are, regarded as supplying the elements of prediction: but when brought to the test of accurate examination and figures, the supposed influence of the moon's changes on the coming weather is found a delusion. This was shown especially by an examination of 50 years' observations at Greenwich,

and similar old records of the weather. For some years Thomas du Boulay predicted the general character of the weather of each summer from the weather conditions which prevailed during the week of the spring equinox preceding, supposing that the general character of the weather of the next six months is then settled, requiring only skillful reading. For a few years he speculated in grain on the faith of these predictions, which turned out correct on the whole; but later his predictions did not come true. Many persons forget that a great number of indiscriminately chosen instances are required for the verification of any theory of weather forecasting; and that more than half of these, when impartially considered, must be favorable to the soundness of the theory, else the result is attributable to chance alone.

Within the past few years progress has been made in two branches of experimental work, which may soon lead to marked advance in the line of forecasting. In the first place, the exploration of the upper air by means of kites and captive balloons carrying registering meteorological apparatus is yielding much knowledge of the distribution of atmospheric temperatures, currents, and electrical conditions, which can hardly fail to promote the accuracy of storm forecasts.

In the second place, the recent work of the Smithsonian Astrophysical Observatory, begun under the direction of the late Secretary S. P. Langley, has tended strongly to show that the radiation of the sun (on which, directly or indirectly, all weather elements depend) is not constant, but varies often through a range of 10 or even 15 per cent. in a few months. The connection between the temperature of the earth and the radiation it absorbs from the sun is such that a permanent decrease of 10 per cent. in the latter would produce about 7° Centigrade (12½ F.) fall of the earth's mean temperature. But owing to the short period of the observed solar changes, and to the great capacity for heat of the oceans, the actual effect of the changes of solar radiation would generally be much less than this. Stations near the oceans will be only slightly affected, while stations in the interior of the great continents are apt to feel more nearly the full effect above estimated. On account of the secondary effects of changes of solar radiation upon cloudiness, and the reaction of cloudiness on temperature, the temperatures of different stations will be differently influenced. Owing to the immense size of the sun a considerable time must elapse before conditions affecting his radiation can reverse, and thus it seems highly probable that when the exact connection between the changes of solar radiation and the weather has been determined, it will be possible to predict the prevailing characteristics of a season, whether cold or hot, wet or dry, for some weeks, and perhaps one or two months in advance.

WEATHER SIGNALS, in the United States Weather Bureau, are signals for announcing the approach of storms. They are as follows:

A cautionary signal (displayed only at stations on the lakes).—A red flag (eight feet square) with white centre (four feet square) indicates that the winds expected will not be so severe but well-found seaworthy vessels can meet them without danger.

A storm signal.—A red flag (eight feet square) with black centre (three feet square) indicates that the storm is expected to be severe.

A red pennant (five feet hoist and twelve feet fly) displayed with the flags indicates east winds—that is, from northeast to south, inclusive, and that the storm centre is approaching.

A white pennant (five feet hoist and twelve feet fly) displayed with the flags indicates west winds—that is, from north to southwest, inclusive, and that the storm centre has passed.

When red pennant is hoisted above cautionary or storm signal, winds are expected from the northeast quadrant; when below, from the southwest quadrant.

When white pennant is hoisted above the cautionary or storm signal, winds are expected from the northwest quadrant; when below, from the southwest quadrant.

Night signals.—By night a red light will indicate east winds; a white above a red light will indicate west winds.

The Information Signal consists of a red pennant and indicates that the displayman has received information of a storm covering a limited area, dangerous only for vessels about to sail to certain points. The signal will serve as a notification to shipmasters that important information will be given them upon application.

WEATHERFORD, Texas: city, county-seat of Parker co.; on a branch of Trinity River, and on the Gulf, C. & S. F. (Atchison, Topeka & Santa Fé), the Weatherford, M. W. & N., and the Texas & P. R.R.'s; about 65 m. w. of Dallas. It was settled in 1850 by persons from east Texas and the older states. In 1856 it was incorporated, and in 1858 chartered as a city. It is in an agricultural and stock-raising region; wheat, cotton, and corn are among the principal productions. In 1900 (government census) the city had 83 manufacturing establishments. The chief manufactories are oil mills, cotton mills, cotton compress, ice factory, machine shops, and the light-plant. There are 10 churches. The educational institutions are Texas Female Seminary (Cumberland Presbyterian), Weatherford College (M. E. South), a high school, established in 1885, St. Joseph's Academy, Hughey and Turner School, public and parish graded schools. The government is vested in a mayor and a board of aldermen consisting of eight members.

WEATHERLY, *weth'er-li*, Frederic Edward, English song writer and barrister; b. Portsmead, Somerset, 1848, Oct. 4. He was graduated from Oxford in 1871 and was called to the bar of the Inner Temple in 1887. He is widely known as the writer of popular songs. Among them are *Nancy Lee; Polly; Three Old Maids of Lee; Darby and Joan.* Of his published volumes mention may be made of *Muriel and Other Poems* (1870); *Wilton School* (1872); *Oxford Days* (1879); *Rudiments of Logic* (1879); *Questions in Logic, Progressive and General* (1883); *Two Children* (1884); *Lays for Little Ones* (1898).

WEAVE, v. *wēv* [Dut. *weven;* Icel. *vefa;* Dan. *væve*, to weave: Ger. *weben*, to move to and fro, to weave: Skr. *vap*, to weave]: to form in a loom, as cloth; to unite by interlacing or intertwining; to entwine; to work at the loom; to devise or construct, as a story or plot. Weav'ing, imp.: N. the act or art of forming cloth in a loom. Wove, pt. *wōv*, did weave. Woven, pp. *wō'vn*. Weaver, n. *wēv'er*, one who or that which weaves; a horse that habitually shakes its head from side to side as the shuttle of a loom. Weaver-bird, a tropical bird which weaves or plaits its nest of twigs, grass, and other fibres.

WEAVER, *wēv'ér*, Aaron Ward: naval officer: b. Dist. of Columbia, 1832, July 1. He entered the U. S. navy as midshipman 1848, May 10; graduated from the Naval Acad., became passed midshipman 1854, June 15, and was commissioned lieut. 1855. In the blockade of the Confederate ports he first commanded the *Susquehanna*, and took part in the capture of Fort Hatteras and Fort Clarke in Hatteras Inlet, of Port Royal, Fort Beauregard, Fort Walker, Fort Pulaski, and Norfolk, Va. Commissioned lieut.-commander 1862, he commanded the *Winona*, gun-boat, in the w. Gulf squadron 1862-3; and participated in the battles of Port Hudson, 1862, Dec., and of Plaquemines. In the n. Atlantic blockading squadron he commanded the gun-boat *Chippewa* 1864, and took part in the first attack on Fort Fisher; and, while commanding the *Mahopac*, he took part in the capture of that place, and was present at the fall of Charleston and at the fall of Richmond. After the war he was commandant of the Boston navy-yard, in 1866 reaching the rank of commander; 1870-1 he commanded the monitor *Terror*, and later commanded the *Dictator;* was commissioned capt. 1876, commodore 1886, and rear-admiral 1893 and was retired 1893, Sept.

WEAVER, James B.: politician: b. Dayton, O., 1833, June 12. He graduated in the law school of Ohio Univ., Cincinnati, 1854, and began practice. At the beginning of the civil war he entered an Io. regt. as private soldier, was elected lieut., and succeeded to the rank of major 1861, Oct. 3. He was commissioned col. 1862, Mar. 12, and was

brevetted brig.gen. 1865, Mar. 13. Returning to his law practice, he became dist.atty. for the 2d judicial dist. of Io. 1866; was internal-revenue assessor 1867–73; then was editor of the *Iowa Tribune* in Des Moines, and was representative in congress 1879–81. As candidate of the greenback-labor party, 1880, for the presidency of the United States, W. received 307,740 votes; he was again representative in congress 1885–88.

WEAV'ER-BIRD: bird of the genus *Ploceus*, family *Fringillidæ*, the 'finches,' and sub-family *Ploceinæ*. The name has reference to the remarkable structure of the nests of these birds, which are woven in a very wonderful and interesting manner of various vegetable substances. The *Ploceinæ* are natives of warmer parts of Asia, Africa and Australia; none being found in Europe or America. They are small birds, with strong conical bill, the ridge of which is slightly curved, the tip entire; claws large and very long; wings pointed, first quill remarkably short. There is great diversity in the nests constructed by different species. One of the best-known species is the PHILIPPINE WEAVER (*P. Philippinus*), the BAYA (q.v.) of India.—Many of the other weaver-birds construct nests on the same plan—pouches elongated into tubes, entrance from below; those of some are kidney-shaped, and the entrance is in the side. They very generally suspend their nests in the same way from the extremities of branches, and often prefer branches which hang over water, probably as affording further security against monkeys, squirrels, snakes, and other enemies. Social habits are prevalent among them, and many nests of the same species are often found close together. Some of the birds attach the nest of one year to that of the year preceding—e.g., the *Ploceus pensilis* of Madagascar, which sometimes thus makes five nests in succession, one hanging to another. Some African species build their nests in company, the whole forming one structure. Thus, the SOCIAL or REPUBLICAN W. of s. Africa (*Ploceus socius* or *Philotærus lepidus*) constructs a kind of umbrella-like roof, under which 800 or 1,000 nests have been found, the nests like the cells of a honeycomb, and arranged with wonderful regularity. An acacia with straight smooth stem, such as predaceous animals cannot easily climb, is often selected by the bird-community. When the situation is chosen, the birds begin by constructing the roof, which is made of coarse grass, each pair afterward building its own nest, which is attached to the roof. As new nests are built every year, the weight of the structure often becomes so great as to break down its support.—*Textor erythrorhynchus* is a bird of the W. group, commonly seen in s. Africa accompanying herds of buffaloes, and feeding on the bots and other insects which infest them: it alights on their backs to pick them out of the hide. The bird is often of great use to the buffalo in another way, by giving warning of the approach of an enemy.—The Whydaw Birds (q.v.), or Widow Birds, also belong to the group of *Ploceinæ*.

WEAV'ING: art by which threads or yarns of any substance are interlaced to form a continuous web; probably the most ancient of the manufacturing arts, for clothing was always a first necessity of mankind. For the general methods of weaving, see LOOM. The art has been developed for various adaptations in a multitude of ingenious variations.—The simplest form of weaving is employed in making the mats of uncivilized nations: these consist of single untwisted fibres, usually vegetable, arranged side by side to the width required, and of the length of the fibres themselves, which are tied at each end to a stick, which is so fixed as to keep the fibres straight and on the same plane, as in fig. 1. Then the weaver lifts up every

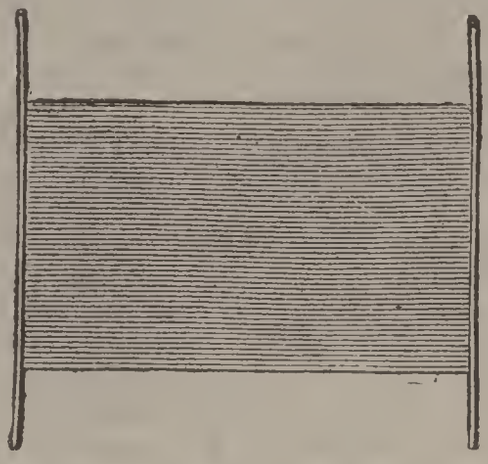


Fig. 1.

alternate one of these longitudinal threads, and passes under it a transverse one, which he first attaches by tying or twisting to the outermost fibre of the side he commences with, and afterward in the same way to that on the other side, when it has passed through the whole series. The acquisition of the art of spinning threads of any length enables more advanced nations to give great length to the warp, or series of threads which are first arranged, and to pass the weft or transverse thread forward and backward by means of a shuttle, without the necessity of fixing at the sides. That kind of weaving which consists of passing the weft alternately over and under each thread of the warp is called *plain* weaving, and a transverse section of the web would be represented by fig. 2; but if the weaver takes up first one and then two threads alternately of the warp series, and passes the weft under them for the first shoot

Fig. 2.

of his shuttle, and raises those which were left down before for the second shoot, he produces a cloth with a very different appearance, called TWILL (q. v.), many varieties of which may be produced by varying the numbers missed or taken up—e.g., one and three, instead of one

and two. The simplest form of twill, viewed transversely would be represented by fig. 3.

Fig. 3.

There are few arts which require more patience or skill than weaving. As many as 1,000 to 2,000 threads often constitute the warp; and these threads may be so varied in quality (see YARN) as to produce many varieties of fabric. From that cause alone, there are almost infinite variations. Many may be produced by the order in which the threads are lifted for the passage of the weft—that of itself can also vary as much or more in its quality and other circumstances, so that the inventive genius of the weaver finds incessant opportunities for its display, and nice arithmetical calculations are required in estimating and allotting the numerous threads to the endless variety of patterns constantly passing through the looms: see the technical treatises—e.g., Watson's *Theory and Practice of the Art of Weaving;* and elaborate treatises by the French weavers. There is no branch of manufacture in which inventions and improvements are more rapidly succeeding each other than in weaving; but, as a rule, they are of minor importance, and rarely affect the general principles of the process. In 1867, however, *Convex* weaving by machinery was introduced; a loom for this purpose having been invented after long effort, which does the work as well as the hand-loom and ten times as fast. The principle of a constant length of travel for the shuttle was adopted for simplicity; but as it is necessary, in weaving the gores, that the weft-thread should pass through only a part of the breadth of the warp, the Jacquard has been employed for taking up the portion of the warp required to be woven in that part.

WEAZEN, a. *wē'zn* [see WIZEN]: thin; sharp—as in *weazen-faced.*

WEB, n. *wĕb* [from Eng. *weave:* Dut. *webbe;* Sw. *väf;* Dan. *væv;* Ger. *gewebe;* Icel. *vefr*, what is woven, a web]: that which is woven; the whole piece of cloth woven in a loom; something resembling such a web; an extensive roll of paper, as used in printing; webbing; a tissue or texture formed of threads interwined; a very fine texture spun by a spider for catching flies; the membrane which unites the toes of many water-fowl; in *OE.*, a kind of dusky film that hinders the sight (see PIN AND WEB): V. to cover with a web. WEBBED, a. *wĕbd,* having the toes united by a membrane. WEB'BING, n. a strong coarse fabric of hemp, 2 or 3 inches in width, used for supporting the seating of stuffed chairs, sofas, etc., for saddle-girths, etc. WEB'BY, a. *-bĭ,* pertaining to or resembling a web. WEB-FOOTED, a. having the toes united by a membrane, as a duck. WEBSTER, n. *wĕb'stĕr,* an old word for *weaver,* properly a female weaver.

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